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OF

OPHTHALMOLOGY

JANUARY, 1947

COMMUNICATIONS

FUTURE POLICY

With this issue of the Journal we are happy to state that it is now possible to use a much better quality paper than war conditions imposed and we hope that this improvement in appearance will be welcomed by our subscribers.

Certain changes in policy have been considered by the Management and some of these are being brought into operation with this number. In the important matter of abstracting ophthalmological literature an agreement has been concluded with the British Medical Association to share in the work they are doing in abstracting world medical literature. All the important ophthalmological publications of the world will be abstracted or noted by the special department of that Association and assisted by our own abstracting service will be made available for us. This service is intended to be fully comprehensive, much more so than was possible for the British Journal of Ophthalmology, and to be up-to-date. As the material available will be greater than can be accommodated in each current number, the British Journal of Ophthalmology will issue, in addition to the normal month's number, a quarterly number of abstracts and it is hoped to include in each of these a summary of new work on some one or other ophthalmological subject. Therefore, henceforth, abstracts will not be published in the regular monthly issues.

RL

Owing to the disruption of life in Continental Europe and the cessation of many specialist publications, authors have been invited to send their papers to the British Journal of Ophthalmology for publication. Many have accepted these invitations and readers of this Journal will find an increasing number of interesting contributions from various foreign countries.

In the matter of illustrations and more particularly colour blocks, it is hoped that we shall be able to print all that are necessary to show clearly the points the authors wish to make. In order to accommodate these it is anticipated that the Journal will have to be increased in size (have many more pages of text) and although paper is still in short supply and its use strictly controlled, it is hoped that sufficient supplies for this purpose will be permitted.

It is obvious that all this will entail a much greater expenditure in the future than in the past, added to this is the increased cost of paper and printing, but the Management feel that our subscribers will prefer to have the much improved journal which is in contemplation. The exact financial implication of all this has yet to be determined and an announcement on this subject will be made later.

"OPHTHALMIC LITERATURE"

An Abstracting Service

In the previous announcement an indication is given that an abstracting supplement will be published quarterly in association with this Journal. To a large extent it will run in conjunction with the abstracting service of the British Medical Association all of whose abstracts are at our disposal, but there will be a considerable number of papers of ophthalmological interest which will be abstracted in our own Ophthalmic Literature, but are not of sufficient general interest to be included in the medical and surgical volumes of abstracts published monthly by the Association. It is very much hoped that our readers will collaborate in preparing these abstracts both for the British Medical Association and for the British Journal of Ophthalmology. We would be glad if those who are willing to participate in the abstracting of ophthalmological papers for the Association would write to the Editor, the Abstracting Service, B.M.A. House, Tavistock Square, London, W.C.1., and those who are willing to abstract such papers as the British Medical Association do not wish to include in their publications would write to Sir Stewart Duke-Elder (Editor, Ophthalmic Literature), 63, Harley Street, London, W.1., stating in either case in which languages they are ophthalmologically proficient in addition to

English. In either case the name of the abstractor will be acknowledged in the text and payment will be made at the rate of thirty shillings per thousand words. Since the literature from January 1, 1947, is being dealt with, an early notification by potential abstractors would be much appreciated.

MR. SURPHLETE, AN ITEM OF OPHTHALMOLOGICAL HISTORY

BY

R. R. JAMES

WOODBRIDGE

IN Sloane MS. 3801 at the British Museum is mentioned the man whose name heads this paper. In my "Studies in Ophthalmological History" I gave a transcript of the manuscript in question, and may here repeat the lines dealing with Mr. Surphlete.

"Then ther was one Mr. Surphlete a man of axeolente Dyet and crusty fasion of bodye. He lived till he was fouere score yeares of age lived moste in Norfolke & dyed at Linn and in good estate. He lay 2 or 3 yeares at a barber's house at Linn to whom he taught som skille, who nowe professethe it with weak Understandinge and gyven to drinke. I cannot com'end this Mr. Surphlete for any extraordinarye skille though of longe experience."

Mr. Arnold Sorsby has called my attention to the fact that Richard Banister refers to the following oculists in the preface to his Breviary: "Henry Blackborne, famous for the forenamed cures; my kinde acquaintance Robert Hall, of Worcester; Master Velder, of Fennie-Stanton; Master Surflet, of Lynne and Master Barnabie, of Peterborough, all excelling in these operations." He goes on to say that "in their case I noticed much practice but little theorie."

The name Surflet is very rare. Research has established the following facts. A small market town named Surflet is near Spalding in Lincolnshire. A Richard Surflytte married at Maplebeck, Notts., Isabel Lynne on 13, October 1563. A man of the same name (but spelt Surflet), matriculated sizar from Trinity College, Cambridge, at Michaelmas, 1576 (Venn). Richard Surflet, Practitioner in Physicke, translated Andreas Laurentius's "A Discourse of the Preservation of the Sight, and a Treatise of Melancholike Diseases, of Rheumes, and of Old Age." This book was printed by Felix Kingston, for Ralph Iacson, dwelling in Paules Churchyard at the Signe of the Swan, 1599. It is dedicated to Lord La Ware and Ladie Anne, his wife.

Mr. Arnold Sorsby, to whose research I am indebted for my acquaintance with this book, informs me that at the British Museum there are three editions of a book on farming by Richard Surphlet, the last of which is edited by Gervase Markham and was published in 1616.

The book is dedicated to Lord Willoughby, and consists of servile sentiments, classical tags and some Hebrew phrases. Mr. Surphlet's preface, addressed to the "gentle reader," is largely a tirade against the female sex.

Mr. Sorsby tells me that the book itself is composed of extracts from classical authors and is a sort of compendium for farmers. Such human and animal medicine as occurs is largely drawn from the herbals.

Markham's only reference to Surphlet is in the dedication to Lord Willoughby's heir. The previous edition "belonged to your . . . . father, as the gift of a learned and well experienced gentleman, who in the translation took a long and well merited labour."

The will of a Richard Surflet which was proved June 26, 1606, will be given later.

Mr. Sorsby* has suggested to me that the anonymous author of Sloane MS. 3801 may have been Richard Banister himself. I am convinced that he is correct and that I was in error in dating it 1630-40; for in the "Craft of Surgery" by Flint South, edited by Sir D'Arcy Power, I find that on July 8, 1602, Richard Banester of Slyford, Surgeon, was examined and approved by the Court of the Barber Surgeons' Company. It will be recalled that the author of the MS. in question wrote from Sleaford. I think that the man who translated the book of Laurentius may be the Richard Surflet whose name occurs in Venn. It is possible that he may have been the son of the gentleman who was married in 1563. If the will (v. infra) be his he would appear to have been unmarried and to have left his money in trust to apprentice the most godly of the sons of three other members of the Surflet family to some honest and profitable trade. These may have been his brothers, though he does not say so. The will which follows is according to the common form of the time; it is chiefly remarkable for religiousness amounting to fanaticism. Richard Surflet was obviously a Calvinist of the most fanatical type, at the same time he was evidently a scholar, familiar with Greek, Latin and Hebrew. The inventory of his goods shews him to have been rather a dandy, and his library must have been rich in works on divinity and medicine. He was going to sea, possibly to Spain as he took Spanish money with him. At the same time he must have been anticipating cold weather, or he would hardly have noted the stockinges "very thick and hayrie, bought at Craconia (Cracow) by a Transilvanian embassadour."

* Vide *Brit. Jl. of Ophthal.*, March, 1934.

I hardly think that Surflet was going to sea as a naval surgeon. At this date James the First had just ascended the English throne; Spain had not recovered from the Armada; and I should surmise that Surflet was simply going abroad. One can imagine the difficulty the executor would have had in deciding which of the sons was the most godly; and if either of them were the ophthalmic quack I think he would have probably been ruled out at once.

I have given footnotes to elucidate the various odd terms which will be found in the inventory, as well as such books as I have been able to identify.

I am obliged to Mr. Harvey Bloom for the transcript of the will.

The Will of Richard Surflet (P.C.C. Stafford, 434)

As I came from the earth the common mother of all mankinde: soe I knowe I shall returne unto the same againe, and with others the workes of God be resolved into my first matter, and seeing the time as a thinge moste uncertaine, is unknown me, but nowe uppon this goinge to Sea more probablye approachinge, by reason of the longe and dangerous occurences dependinge thereon. I thoughte it my parte to set my thinges in order, that soo if God doo call me hence, I maye be the freer to wayne myselfe from worldly and transitorie thinges. And to have my mynde onely intente uppon these wherein true felicity is placed. And first I bequeath myselfe sowle and bodye to that most lovinge and mercifull God who hath given his sonne Jesus Christ, borne of a woman, to suffer death uppon the crosse for me and all the elect, nott doubting but that as he hath nombered my dayes and is of all sufficient power to restore me agayne in health and safetie to my Native Soyle (ife soe it seeme good to him in his infinite wisdome) soe he will after my dissolution (whether by land or sea) receave me for the same his Christes sake, into eternall blisse; forgivinge me all my synnes originall and actuall, imputinge unto me the full and perfect obedience of his deare and onely begotten sonne whereby I shall stande unspotted and blameless before his throane of justice, never to be called into judgement but to passe from death to life; as for the goodes which God of his mercie hath blessed me with all my desire is that they be all sould and turned into money, of the money I give to William Bingham, a carver dwelling in Gleane Alley in Southwark, thre pounde six shillinges eight pence. To Maister Travers and Maister Egerton twentie shillinges a peece. To Maister Bandeforde and Mr. Paget of Detford tenne shillinges a peece. To Mr. Crosley, whom I make Supervisor for the dischargінge of this my wyll, and to receave whatsoever moneyes may any manner of way be due unto me, the somme of fiftie three shillinges and fower pence. To his wiefe tenne shillinges. And to every one of his daughters six shillinges eight pence. The Rest of all such moneys as shall remaine, I desire to be layed out in some lease as may be most proffitable either in the Cittie or Countrey: And the yearelye revenue growinge thereofe for the space of every six yeres to be bestowed in the placinge and stockinge of some one of the sonnes of Richard Surflete John Surflete or Robert Surflete suche as shall be ofe most hope for Godlines or towardlines, with some Religious and honest man, in some good and commendable trade; But the Revenue of the seaventh yeare I desire to be bestowed uppon the godly distressed and afflicted and this by mutuall intercourse to be contynued from seaven yeres to seaven yeres to the full expiration of such of twentie one yeres, and ife it should please God to call Maister Crosley away by death before such tyme expired. Then my desire is that he would commende these partes and offices to be performed by some other honeste frende of his fearinge God, or else to gett Maister Travers or Maister Egerton or some other faithfull minister such as shall then be of good reporte like unto them here in the Citty to procure one to doe the same to which my last wyll and Testament made the first of March one thouzand six hundred and three I putt my hande and seale in the presence of us Hugh Evans, William Tilney, William Shambrooke, Abraham Webbe. By me Richard Surflete :—Left in the Cyttie.

An Inventorye of such goodes as I carie with me to the Sea or otherwise leave

with my friendes in London made the day and yeare within wrytten. Imprimis one great vessell of bookes at Maister Theralde the Lynnen Draper his house in Fryday Streete at the Signe of the Maydens head and Unicorne, and in the same place one old hampear with nothing but trash. Item at Maister Crosley his house at the Goulden Lyon at the Stockes one hamper and in it a clock called an alarum, a great box with Surgery instrumentes a lesser box called a playste or box with surgery instrumentes, also some of silver and some of iron, a box with my letters of orders, a license to practise Physique my clocke plummettes and a canvas bag with sundry sortes of thinges in it. Item one rapyer and a dagger a grograine gowne[1] with a velvet face cape and gurding, a velvet jerkin, a satten doublet. two stuff doublets, two paire of rounde cloth hose, one paire of hose of velvet panes and cannyons,[11] one paire of new Jersie stockinges of fourtene shillinges pryce, one peece of dornix[2] with curtaine ringes at it, one ball of velvet gurding, one newe clarke* faced with velvet, one rydinge clarke and an old paire of baces,[3] one paire of bootes and spurres one cloth sadle with thre girthes a petterell[4] and crupper, one bridle with bytt and bosses, six ruffe bandes of cambrick, one new hatt faced with velvet, one course sheete to wrap my apparrell in, one velvet muff, one velvet cape for a clarke upon cloth.

Taken with me to sea First one Truncke, one mayl thre boxes with lockes whereof one is made deskwyse, two gownes the one of stuffe the other of cloth. one clark faced with velvet, one hat one Dutch cap, one silcke quilted cap, one other cap of Sparta velvet, two fustian nightcappes seaven lynnen cappes, whereof one is a lyttle wrought with black silcke in a border about the edges and thre of the other are newe, five dozen and a halfe of falling bandes two dozen new hande towelles and as many tablenapkins handkerchers, two dozen and a halfe cuffes thre newe paire with black and white edging lace, and as many payres of old ones, two doubletes of stuffe, fower jerkins, one of silcke another of cloth, the two other of stuffe, one newe the other olde, two crane feathered fustian mandillions,[5] two paire of drawinge breeches of the same, fower paire of clothe breeches, two trusses of canvas six paire of lynnen breeches six fustian wastcoates, eightene newe shirtes, and six old, thre paire of oiled leather lyninges five paire of lynnen stockinges whereof fower are newe, one paire of worsted stockinges blacke and newe, two paire of Jersey but old, a fowerth paire of woollen yarne newe, a fifte pair of russet cloth, and a sixte of whyte knytt ones very thick and hayrie, bought at Craconia[6] by a Transilvanian Embassadour, newe shoes three paire, old shoes two paire one paire of pumppes and pantofles[7] olde, a paire of slippers and olde paire of lyned moyles, but lyttle or nothing worne, one paire of newe Pennyston[8] blancketes, three new paire of hose garters, two of crewell and one of silcke, one bedrugge newe, one woolbed and two pillowes, two fustian pillowberes[9] newe, one mat, one brush for clothes, one headbrushe, a lookinge glasse, two combes of box in cases, a paire of snuffers, an extinguisher a wooden standish[10] with penknife etc a fayre Inckhorne with a penner and sandbox two, and of the same, fower newe paire of gloves, an old motley clokebagge, bookes a hundred and eight or thereabouts and of name as followeth, one hebrew bible one Tremelius in fol. one English bible guylded and prynted at Geneva, a French bible, one Greeke Testament, one French Testament, Calvine on Deuteronomy and Job, Calvine uppon the Psalmes in Latin, one Institution and epistles, Beya his epistles, and confessions, Du Plessy against the Masse, Grinous workes Parkins[12] workes fol. Daneus on the Lords Prayer his ethicks and Isagoge *Christiana* in 2 vol. One Polain *Theses*, and *Theses Genouses* one Perkin's[13] problem, his booke, *de predestinatione* his *prophetica* and *Specimen degestri*, one Ursinus *Catechisme Sculteti medulla patruum*, *Flores Doctorum*, one small Tablebooke the drum of doomesday. Kewstubbes[14] on the Commandementes. Deanuge's lectures, Virel's dialogues, Bakers[15] lectures on the Creede, the harmony of confessions. Fenner's[16] *Theologia*, the Councell of Trent. One Perkins of Sathan's sophistry. Hunter's Cosmographie, one sermon of repentance six small catechismes the goulden booke of the leaden Godes. Brocard on the Cantacles. Finch his divynitie, one treatise of fastinge set forth in Scotlande, one Immytacon of Christ. One forme of comon prayer, one monomachie of motives, Cartwright's[17] little Catechisme wrytten, one other booke of the forme of common prayer etc, one other Catechisme with the text of the Quotations, Stephanus his concordance Fenners household discipline one destruction of smale vices, one other smale Cathechism. Fornelius[18] his workes fol. Piso his methodus etc. Valverda[19]

* Cloak

his Anatomicall tables, Bannasters[20] Anathomy, Weckers'[21] special Antidotane, Parry[22] his surgery, Schenkens[23] his observations 2 vol. Penotus[24] *de vera preparatione medicamentorum chymicorum*, The Cure of diseases in remote Regions, Gratias *ab horto* of East Indian Simples. Laurentius[25] de Cresibus, Clowes[26] his practise of Surgery, Botellus[27] *de missione sanguinis*, Willichus[28] *de Urinarum probationibus* Wecker's surgery in English, Rouseus[29] *de magnis hipp lienib*, one great lexicon, one Thom: dictionary one *dictionarium poeticum*, Martinus Gramer, Paginus Epitome, Scotus Greeke gramer, Mathiolus of the facultyes of simpies. decimo sexto, one Taleus Rethorick, Cartwrightes Treatise of Fastinge, Phregius his pedagogus one Licesthenes Apothegmes, Aristotles Sentences, Tullyes Sentences, *Flores poetaeum*, the small Greeke poets. Verons Phisickes, Daneus his Physicke, Ovids Metamorphosis, three small paper bookes. Bourne his Regiment for the Sea, one bounde paper booke conteyning one quire folio, paper booke conteyning one Epitome of Mr. Cartwright uppon the Commandementes and twentie poundes in Spanish Ryalles

Commission to administer was granted to William Crosley, June 26. 1606.

A search of the Parish Register of King's Lynn by the Verger gave the burial of the daughter of a physician there in 1630, which seemed at first sight as if it might be a name like Surphlet; but the tracing which he sent makes it more likely to have been Curtis:—"Margaret Curtes d. of Mr. Richard Curtys, a physitian."

I do not of course pretend that this paper settles the question as to who Mr. Surphlet, the quack oculist was. The testator may have been the translator of Laurrentius, but it is odd that he did not mention his own work in his inventory. We know that the quack died at Lynn; and it is to be assumed that the testator lived in London or Southwark. He probably died abroad, and proof of death must have been forthcoming for administration to be granted to his executor.

The will is of interest in many ways and partly as shewing what a medical man at that date thought fit to take to sea with him.

FOOTNOTES

1. A red silk gown.
2. Usually spelt Dornick, a species of linen table-cloth, used in Scotland, and originally made at Deornick, in Flanders.
3. Probably braces.
4. A horse's breastplate.
5. A soldier's coat.
6. Cracow, capital of Poland.
7. Slippers.
8. Possibly Penistone in Lancashire.
9. Pillow beer, a cover for pillow-case.
10. A writing desk for ink, sand, wafers, etc.
11. Panels and lappets.
12. William Parkins (1558-1602). A staunch Calvinist whose works were translated into Dutch, Spanish, Welsh and Irish. The most famous, his *Armilla Aurea* (1590) went to its 15th edition in 20 years. *Dict. Nat. Biog.*
13. *Vide supra* Parkins.
14. Possibly John Stubbs or Stubbe, a puritan Zealot. (1543-1591). *Dict. Nat. Biog.*

15. Possibly Sir Richard Baker (1568-1645), Religious and Historical writer. *Dict. Nat. Biog.*
16. Dudley Fenner (c. 1558-1587) Puritan Divine. His *Sacra Theologia* was published in 1585. *Dict. Nat. Biog.*
17. Thomas Cartwright (1535-1603). A Puritan. *Dict. Nat. Biog.*
18. Jean Fernel (1506-1588). His *Universa Medicina* was published in folio in 1567.
19. Valverda de Hamusco. His Anatomical Tables (Rome, 1556) are well known.
20. John Banester (1533-1610).
21. J. J. Wecker, the author of *De Sceretis*, 1582. *Antidotarium, generale et speciale.* 1601.
22. Ambroise Paré.
23. Schenckius, James. Observations. *Lib.* VII. *de Veneris.* 1597.
24. Penotus. 1602.
25. Laurentius, on Crises.
26. Clowes, the well known English surgeon. Surgeon to St. Bartholomew's Hospital.
27. Leonardus Botallus. *Dr. Curatione per Sanguinis Missionem.* 1583.
28. Willichius. *Urinarum Probationes.* 1582.
29. Rouseus was the author of some works but I have not been able to identify the one mentioned here.

*REMOVAL OF THE WRONG EYE**

BY

H. M. TRAQUAIR

EDINBURGH

THE most terrible disaster which can occur to the ophthalmic surgeon and to his patient is "removal of the wrong eye."

It might be thought that this accident was merely a possible but unlikely danger about which teachers should warn students but which has never actually occurred. That was my impression when I wrote in 1916[8] that by the use of local analgesia "the possibility, however remote, of such a calamity as its (the wrong eye's) removal is totally avoided." At that time I imagined that removal of the wrong eye was a hypothetical possibility rather than an actual fact, a view which had been to some extent previously expressed by Hermann Knapp[2] when he wrote in 1898 " . . . . we should be on our guard lest we take the good eye out. This awful mistake is sensationally mentioned in text-books and periodicals; I do not know whether it has actually occurred, but the possibility is undeniable."

Knapp's statement was based on the literature before 1898. Of over sixty text-books on ophthalmology and ophthalmic surgery

* Received for publication, December 4, 1946.

published before that year I have been able to examine thirty-seven in only one of which (Mauthner[1]) is the subject mentioned. Only four of fourteen books published since 1898 contain references and also two later editions of older works (Lawson[3], Czermak[5]). Recent works do not mention the subject, the Graefe-Saemisch Handbuch[9] (Sattler, 1922), appears to be the latest. Medico-legal text-books are likewise silent. There cannot have been many "text-books and periodicals" in which Hermann Knapp found the subject "sensationally mentioned."

It may be noted that of eight direct references only one is British, the remainder being German and American.

There is, nevertheless, abundant evidence that this catastrophe has actually occurred. Apocryphal stories exist in relation to both eastern and western hemispheres; a well-known one is that of the surgeon, who on discovering his mistake rushed into an adjoining room and shot himself. According to another the patient received a *solatium* of £10,000 and a pension. It is related that in a case (presumably of glioma) in a child, the surgeon, having removed the wrong eye, promptly removed the other one also and explained to the parents that bilateral removal was necessary as the disease always affected both eyes. In this instance, however, it is within the bounds of possibility that the surgeon's error saved the patient's life. Such stories have no value as evidence, their only interest lies in the suggestion that where there is smoke there is probably fire.

The scanty references in the literature mostly contain warnings against the risk of the accident and advice as to how it may be avoided. The method recommended is the indication of the eye to be removed by affixing a piece of adhesive plaster on the brow or in some other way such as by bandaging it. The earliest reference I have found is that of Mauthner[1] who wrote in 1881 that he had been personally present when the mistake was *nearly* made in a case of sympathetic ophthalmia. His own words are worth quoting:—

> "Bei der Enucleation, wie sie auf dem Gebiete der sympathischen Leiden kommt, ist aber Eines die Hauptsache, und dies ist, dass man das richtige Auge enucleïrt. Das scheint ein müssiger Rath, vielleicht ein Scherz, aber wer wie ich schaudernd dabeigestanden, wie statt des erblindeten Auges bald das noch sehende enucleïrt worden wäre, scherzt nicht bei diesen Worten. Das Versehen ist nicht so unerklärlich, wenn man bedenkt, dass die Enucleation ja so häufig bei schon entwickelter sympathischer Kyklitis ausgeführt wird, dass im Aussehen der beiden Augen nicht immer ein markanter Unterschied bemerkbar ist, und dass der Operateur, sein ganzes Augenmerk auf die Operation richtend, sich willig vom Assistent leiten lassend, die Operation an jenem Auge beginnt, in welches der Assistent irrthümlich die Lidhalter

eingelegt. Der Patient rührt sich nicht, denn er ist - - - narcotisirt."*

Elschnig[5], re-editing Czermak's book on ophthalmic operations, quotes Mauthner and adds the following passage:—

"Dasselbe konnte aber, und vielleicht noch leichter, vorkommen wenn es sich um einen intraokulären Tumor handelt, der noch zu keinen Veränderungen am vorderen Augapfelschnitt geführt hat. Da sehen beide Augäpfel ganz gleich und normal aus. Man gebe sich also vor Beginn jeder Enukleation Rechenschaft, welches das zu enukleïerende Auge ist, und in Fällen, wo sein Ausseres nicht sicheres Merkzeichen trägt, verlasse man sich nie auf sein Gedächtnis, sondern sehe unmittelbar vorher in seiner Vormerkung nach. Das mag manchem als überflüssige Vorsicht erscheinen, allein beim besten Gedächtnisse *kann* einmal ein Irrthum unterlaufen, und wenn er in einem derartigen Falle unterliefe - - - ist es überflüssig das auszumalen.

(Ein Irrthum ist jedenfalls dann ausgeschlossen, wenn das zu enukleïerende Auge vor Beginn der eventuellen Narkose gereinigt und mit einem Heftpflasterbande geschlossen wird.)

(Soll übrigens seither schon tatsächlich vorgekommen sein!)."†

The interesting point in Elschnig's statement is contained in the footnote which shows that, evidently in spite of precautions, a case had occurred within his knowledge.

Haab[4] mentions the danger associated with a general anaesthetic and points out that both eyes may be abnormal in appearance though equally so, as in sympathetic ophthalmia. This condition, however, as a factor in connection with removal of the wrong eye is of little

* "In enucleation, as practised in sympathetic affections, it is of chief importance *that one enucleates the correct eye.* That may appear superfluous advice, even a joke, but one who like myself has stood horrified while the seeing eye was nearly enucleated instead of the blind one will not find amusement in these words. The accident is not so unexplainable when one remembers that enucleation is so often performed in already developed sympathetic cyclitis, that there is not always a pronounced difference in the external appearance of the two eyes, and that the surgeon, all his attention directed towards his operation and willingly allowing himself to be guided by his assistant. begins the operation on the eye in which the assistant has mistakenly inserted the speculum. The patient does not disturb himself, for he is . . . anaesthetised."

† "The error can even more easily occur when dealing with an intra-ocular tumour which has not caused any changes in the anterior segment of the eye. Both eyeballs appear normal and the same. Before beginning any enucleation one should therefore provide oneself with a statement as to which eye is to be removed, and in cases where no definite external sign is present one should never rely on one's memory but should refer to notes immediately beforehand. That may seem to many a superfluous precaution but even with the best of memories it *is* possible for an error to slip in, and if in such a case it should occur - - - it is unnecessary to say more.

(A mistake can, in any case, be excluded if, before commencing the anaesthesia, the eye to be removed is cleaned and covered with an adhesive plaster).

(Since then a case has already, after all, actually occurred!)."

importance nowadays as the offending eye is usually removed at the earliest sign of change in the other or before any sign has appeared.

Beard[6] writes "That this most deplorable accident is not beyond the realm of the possible has been abundantly proven and that by more than a single instance."

Wood[7] says "Lamentable but, fortunately rare instances have occurred....."

"Near misses" (Mauthner[1], Lawson[10]) are relatively more common. In these the operation is commenced or about to be commenced on the wrong eye, or wrong side, but the mistake is discovered before serious harm has been done. Conversations with colleagues indicate that many have had experiences of this nature.

There is much evidence that paired or multiple organs can easily be confused. Burrows[11], writing of operating on the wrong side for hernia states "Such confusion between the left hand and the right appears to be no rare thing in clinical note, taking;....."
Here the error is in the notes rather than in failure to refer to them. The wrong eye has been operated on for cataract, the wrong kidney and the wrong finger have been operated on, and the wrong leg has been amputated (for sarcoma). Innumerable wrong teeth have been extracted: the present writer has made this mistake himself.

For the removal of the wrong eye two postulates are essential:— The patient must be under a general anaesthetic and the eye to be removed must not be obviously different in appearance from the other. Secondary or adjuvant causes include omission to indicate the eye by a mark on the forehead or even delegation of the marking to a nurse or house surgeon, an error in the notes, or omission to verify the eye to be removed by examination or reference to notes immediately before the operation. The surgeon may hurry into the operating theatre where the patient is waiting on the table completely anaesthetised and proceed without delay or further scrutiny to remove "an" eye.

It is evident that advice to mark the eye and the other precautions mentioned, which have been recommended during the last fifty years and are included in the teaching of many ophthalmic surgeons, have not produced the desired results as cases have occurred within recent years. It will, presumably, never be known except to those directly concerned whether the mistake has ever occurred owing to marking of the wrong eye or an error in the case notes but such possibilities constitute the weak point of reliance on any safeguard other than immediate pre-operative examination of the patient in cases in which a general anaesthetic is used.

The diseases concerned, in actual instances, have been intra-ocular tumour, glaucoma, and sympathetic ophthalmia, probably mainly the first. Nothing is known as to even the approximate number of cases. As might be expected, in every known case a general anaesthetic was used.

In infants and young children the risk must be taken and it is the duty of the surgeon to take proper precautions personally, and not to delegate such an important responsibility. The eye should be examined immediately before the operation while the patient is on the table. If a general anaesthetic is to be given either to an adult or to a child administration should not be commenced until the surgeon is present.

The only infallible preventive, if any measure can be infallible, is the use of local analgesia. This method should be adopted in all adult cases in which the eye to be removed is not obviously and distinctly different in external appearance from the other.

A paragraph on this subject should be included in every text-book in which removal of the eye is mentioned.

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THE INTRA-OCULAR FOREIGN BODY

A Series of 72 Cases in the B.L.A.

BY

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LONDON

THIS paper is an account of 72 cases of penetrating wounds of the eye with retained intra-ocular foreign body which came to a field hospital in Normandy and a 2,000-bedded General Hospital in Belgium (B.L.A.) from July, 1944, to the end of hostilities in Europe in May, 1945. It is the sequel to a report of 102 such cases, treated from the beginning of General Cunningham's offensive in the Western Desert (M.E.F.) in November, 1941, to the end of

the North Africa campaign in May, 1943, which was published in the *Brit. Jl. Ophthal.*, Vol. XXVIII, p. 105, 1944.

As the following statistics show, these cases include besides battle casualties accidental injuries in field workshops, and injuries inflicted by foolish and negligent handling of military weapons.

The majority of foreign bodies produced by the fragmentation of modern war missiles are so lowly magnetic that the importance of more accurate localisation than is necessary in civil practice soon became evident to us for it was essential to bring the terminal of a giant electro-magnet as near to the intra-ocular foreign body as possible in order to effect its extraction. When this was done in a number of cases in which the foreign body had been labelled as non-magnetic in other medical units it was extracted. Probably the fault in these cases lay in relying on the so-called " magnet test " in which pain is elicited on applying the magnet to the eye. Either the foreign body when attracted to the magnet moved a certain distance but did not quite reach the retina and choroid (a fact sometimes seen when the foreign body could be followed with an ophthalmoscope whilst the terminal of a giant-magnet was brought as near as possible to the sclera) or the impact was too gentle to elicit pain, or as it seemed in some cases the sensation of

TABLE A

Route of extraction	M.E.F. 102 cases			B.L.A. 72 cases		
	B.C.	Acc.	Total	B.C.	Acc.	Total
Posterior (Scleral) route	22 (21·5%)	9 (8·8%)	31 (30·3%)	32 (44·4%)	5 (6·9%)	37 (51·3%)
Anterior route	5 (4·9%)	3 (2·9%)	8 (7·8%)	9 (12·5%)	4 (5·5%)	13 (18%)
Total	27 (26·4%)	12 (11·7%)	39 (38·1%)	41 (56·9%)	9 (12·4%)	50 (69·3%)

Table A shows the percentage of intra-ocular foreign bodies extracted by a giant electro-magnet through (1) the scleral route (2) the anterior route.

M.E.F.—Middle East Force.

B.L.A.—British Liberation Army.

B.C.—Battle Casualty.

Acc.—Accidental injury.

the intra-ocular membranes was temporarily impaired by either contusion or concussion changes. An even more probable cause of failure was the use of a giant electro-magnet terminal at a distance too remote to move the intra-ocular foreign body to a position where it could be either felt or seen. Particularly was this so when attempts were made to bring forward a foreign body from the vitreous in the first stage of the anterior route technique for extraction.

Table A shows that with improved equipment and proper technique the successful extractions of intra-ocular foreign bodies were increased. Although the type of war missiles was much the same in both theatres of war the figures for Normandy and Belgium (despite working under crude field conditions in Normandy) are better than those of the Middle East Force.

It is possible that in future with an improved magnet the number of successful foreign body extractions by the scleral route might be increased.

Investigation

A reliable diagnosis can only be made with a good light such as either the Lister or scialytic operating lamp, surface anaesthesia with pantocaine 1 per cent., a Desmarres' retractor, binocular loupe, the slit-lamp and corneal microscope, ophthalmoscope, Schiötz tonometer (in some cases) and radiography. It is essential to examine carefully the adjacent anatomical structures bounding the orbit, the nose, face, and skull; particularly is this so in military surgery, where a missile in its course may have damaged the face, accessory nasal sinuses, eye, orbit, and intra-cranial contents. In one case a fine shell splinter had penetrated the occiput, traversed the intra-cranial contents, entered the orbit from behind and penetrated the sclera to come to rest in the vitreous. The small scalp wound had healed and the soldier was unaware of its existence. In another instance the intra-ocular foreign body had traversed the right eye (a through and through scleral wound) the right os planum, nasal septum, left os planum and through the sclera on the nasal side of the left eye. The general condition of the patient must be considered, haemorrhage from other wounds and shock requiring first attention. It is surprising how little the majority of eye wounds suffer from being left alone after simple cleansing of the eye and lids and covering with a pad and bandage. In the Western Desert and North African campaigns in 1941, 1942 and 1943, delay in evacuation of casualties through the field ambulances and casualty clearing stations amounted in some instances to 5 to 12 days before the soldier with an injured eye reached an eye

surgeon. It was remarkable to see many such eyes with little or no clinical evidence of inflammation.

However, in the case of intra-ocular foreign bodies prompt surgical attention is desirable in principle. Delay may allow the foreign body to become entangled in a collection of fibroblasts, and a mass of surrounding exudate, possibly infective, may jeopardise other intra-ocular tissues by trailing the foreign body in the course of its extraction.

An entry wound in the sclera may be difficult to find when it is only a millimetre or so long and has healed by the time the patient is seen. In military surgery a guide to its position may be given by a snick in the lid margin, a wound in the eyelids and the skin adjacent to the orbit. With the slit-lamp and corneal microscope the bulbar conjunctiva is seen adherent and puckered at the site of the scleral wound. In grosser cases a small knuckle of herniated vitreous covered with young fibrous tissue and conjunctiva is sometimes evident.

The scleral wound may be behind the equator and the reflection of the bulbar conjunctiva and so will not be seen until Tenon's capsule is opened in surgical exploration of the injured site. In such cases the lens is often clear, unless the foreign body has passed obliquely forwards and struck it, and so ophthalmoscopic examination will reveal the site of the entry wound unless this is obscured by a severe intra-ocular haemorrhage.

Aluminium and some non-magnetic alloys give rise to no apparent signs of irritation inside the eye and when small are best left alone. Larger non-magnetic foreign bodies causing visual obstruction and likely to cause intra-ocular inflammation may be removed by an instrument introduced into the eye when the foreign body can be seen by means of the ophthalmoscope and the instrument thus guided to it under view. Small fragments of glass and bakelite may remain quiescent in the eye for years but some, particularly when situated in the filtration angle or on the iris, cause irritation and require removal by forceps, blunt hook or scoop. Copper and stone cause rapid intra-ocular inflammation in most cases and evisceration becomes necessary. There are, however, some cases of soldiers who retained multiple minute particles of stone on the iris and in the cornea and sclera following a land mine or booby trap explosion whose eyes settled down after several weeks' or months' irritation and have remained quiet. Possibly the fragments were rendered sterile in the explosion and so are unlike those seen in civil injuries, which often become infected.

Important facts are the likely nature of the missile striking the eye, the force and direction from which it came, and the position of the patient's head when the foreign body struck him. In war

wounds fragments of metal removed from other parts of the body are tested by a magnet and so afford useful information as to the probable character of the intra-ocular foreign body.

Localization of the intra-ocular foreign body

1. *Ophthalmoscopic.*—In 17 out of 102 cases of intra-ocular foreign bodies from war missiles in the Desert Campaign 1941-43, in 28 out of 72 cases in the fighting in France, Belgium and Germany 1944-45, the foreign body was seen by the ophthalmoscope. In 21 of the latter it was extracted by the posterior route (through the sclera), 19 by the giant electro-magnet and 2 by forceps under ophthalmoscopic control. Three were extracted by the anterior route. In the remainder the foreign bodies were non-magnetic. These were less than 0·5 mm. in most instances, showed no evidence of adjacent inflammation, and so were left.

The ophthalmoscope is also of great use, in cases where the media are clear and the foreign body can be seen in the vitreous, for finding out whether it is magnetic or not and the excursion it will make on application of the magnet terminal to the sclera at the nearest accessible point to it. If the foreign body reaches the retina on applying the magnet then it may be extracted through a scleral incision. In some cases, particularly those of very small foreign bodies, 0·25 mm. or less, the foreign body may move only a few millimetres in the vitreous and not reach the retina. In some such cases postural treatment and repeated applications of the magnet may eventually make it accessible for removal. In 8 instances the foreign body moved between 1 and 4 mm. and did not reach the retina, and in 6 of these it was extracted by the magnet after opening the sclera, choroid and retina.

It is important not to be misled by the floating movement of a small particle of a light metal suspended in the vitreous which alters its position with movements of the eye on changing the position of the head. Before applying the magnet the position of the foreign body should be carefully noted for this may be different in the lying and sitting positions. The magnetic movement is quite unmistakable, it is a sudden jerk towards the magnet.

2. *Radiographic.*—Radiographic localisation of an intra-ocular foreign body is essential in every case of injury due to war missile even though the foreign body is evident on ophthalmoscopic examination, for X-rays may reveal the presence of other foreign bodies. It is, however, not an infallible test for in a number of cases X-rays failed to reveal small foreign bodies of less than 1 mm. which were seen with the ophthalmoscope, were magnetic and extracted through the scleral route.

There are about 30 methods of X-ray localisation of intra-ocular

foreign bodies. These have been classified into 6 groups in Vol. III of " A Textbook of X-ray Diagnosis " by British Authors and also are fully described in " La Radiographie en Ophtalmologie " by E. Hartmann.

Perfection in the radiographic localisation of an intra-ocular foreign body has not yet been reached. The technique selected often depends upon the nature of the case and the apparatus available.

Under ideal conditions there should be a device for keeping the head absolutely immobile, the provision of an occipital rest and a horse-shoe shaped bar covered with soft dental stent wax for the patient to bite achieves this purpose. Immobility of the eye during exposure to X-rays is effected by the provision of a suitable target, such as a black cross on a white background for the patient to look at. Several such targets are necessary when views are taken of the eye looking in front, up, down, to the nasal and temporal side. The patient is more comfortable either lying on his back or sitting up. Some positions such as lying face downwards and looking into a mirror at close range (Comberg's technique) are awkward and painful. Multiple wounds necessitate the dorsal position and the radiographic technique must be arranged accordingly.

The more elaborate and expensive instruments such as those devised by Sweet and Dixon have a radio-opaque indicator mounted at a known distance (10 mm.) from the centre of the cornea. Additional aids in other procedures where simple apparatus only is available are the attachment of radio-opaque markers to the surface of the eye; these, such as little silver clips or hooks, may be inserted into the conjunctiva or sewn into place such as the limbal ring described below. Skeoch's scleral ring and the corneo-scleral contact glass with either radio-opaque dots or a ring as used by Comberg and Wessely are placed free in the conjunctival sac. The disadvantage of the attachment of either clips or a limbal ring is that a surgical procedure is necessary to effect this. Skeoch's scleral ring and the contact glass are both liable to slip out of position and tilting and moving of these devices is appreciable when the eye is turned in different directions. An error in localisation is likely to occur in such cases. An opaque marker may obscure an intra-ocular foreign body in the antero-posterior view but the latter will be evident in the lateral view. The various methods employed in the localisation of an intra-ocular foreign body may be classified according to the main principle in the technique. These are six.

(1) *Physiological.*—In this method the head is fixed and the eyes are moved in prescribed directions. Some useful information may be obtained by calculations of the movement of a foreign body

on movement of the eye. Two to four exposures may be made on the same film, the patient being directed to look up, down, to the nasal and temporal sides. The eye is sub-divided into 4 quadrants in front of the equator and 4 behind it. The movement of the foreign body will be with the eye in the anterior quadrants, and against it in the posterior quadrants. The centre of rotation of the eye is never a fixed point so that the theoretical assumption that a foreign body at this point would not move does not hold. The surgeon is chiefly interested in the relation of the foreign body to the sclera.

Belot and Fraudet centre the X-ray tube at a point they judge to be the centre of rotation of the eye and take three lateral views looking up, in front and down, and three anterior views looking in front, nasally and temporally.

The difficulties in this method of localisation lie in centring the X-ray tube accurately and in keeping the patient's head absolutely still during the movements of his eyes.

If the foreign body is well clear of the eye in the orbital tissues there is no movement. Displacement sometimes occurs in the orbital fat, a heavy foreign body such as a lead pellet being pressed to another position when the eye is moved.

Movement of an extra-ocular foreign body may also occur when it is situated in Tenon's capsule, an extra-ocular muscle and in the optic nerve. When it is in the bulbar conjunctiva it will of course move but it is visible unless obscured by a subconjunctival haemorrhage. Foreign bodies in the lids also move.

In war injuries the multiplicity of foreign bodies in the orbit make an accurate diagnosis of the number and site of those in the eye very difficult.

(2) *Geometric.*—In this method the head and the eye are immobile, the X-ray tube is moved and views are taken from several known angles with a radio-opaque indicator 10 mm. in front of the centre of the cornea. The calculations are plotted on a chart. Sweet and Dixon use this technique and probably it is the most accurate of all methods. The apparatus is elaborate and expensive, only a few hospitals possess it and it was never available in field medical units in a theatre of war.

Kraus and Briggs claim greater accuracy with their apparatus than any other, the essentials of which are (1) head rest with clamping devices for immobilisation of the head, (2) attached to the forehead cross-bar is a small unit designed to work to fine adjustment and carrying indicators which may be moved laterally, up and down and to and from the eye. These indicators are made partly of radio-opaque and partly of non-radio-opaque materials; (3) X-ray casette holders and perimeter with spot-light.

The indicator, axis of the eye and centre of the X-ray tube must

be in one straight line. The tube (central ray) must not be tilted or distortion will occur. The best anode to indicator distance is probably one metre, at which the magnification will be negligible (1 : 20). Exposure depends on the X-ray apparatus used. For each exposure one of the indicators is placed in contact with the cornea at the centre of the pupil and the scale attached to it will show any magnification.

The calculation of the site of the foreign body is a complicated geometric problem and Stern comments that in this instance it is fallacious and that the simpler limbal ring method gives as accurate results.

(3) *Stereoscopic.*—The principle is the same as the geometric method. One exposure is made with the head in the prone position and inclined toward the affected eye so that the X-ray tube aimed at an angle tangential to the lateral orbital margin may obtain one exposure with the minimum of bone shadow. Another view is taken laterally with a contact glass and radio-opaque ring embedded at the limbus, then 3 successive photographs on 3 different films taken of the eye looking up, in front and down.

This method does not give precise measurements of the distance of the foreign body from the ocular tunics.

(4) *"Simple."* — Hartmann includes in this group X-ray measures which use a radio-opaque marker in contact with or close to the eye and require only simple X-ray apparatus. The circumstances of military surgery in the field necessitate the employment of such methods, for neither elaborate apparatus nor radiologists experienced in this special work are available.

It is therefore imperative to have some simple procedure which may be done expeditely by the eye surgeon and the X-ray department staff operating under crude conditions in a tent.

A brief account of some of the radio-opaque markers has been given above. Of these the limbal ring, Comberg's and Wessely's contact lenses and Skeoch's scleral rings are worthy of mention. The chief advantage of these devices is that by their close contact with the eye they afford greater accuracy in measuring the distance of the foreign body from the known point where they lie against the eye.

The movement of Comberg's and Wessely's contact glasses containing 4 radio-opaque dots or a ring at the limbus and the tilting of Skeoch's scleral ring are causes of inaccurate calculations. Efforts have been made to secure immobility of the marker by suturing it to the conjunctiva. Thorpe (H. E.) had Comberg's contact lens drilled with 4 holes, 3 of these were placed near the periphery of the scleral part of the glass at 3, 6, and 9 o'clock respectively for the purpose of suturing to the bulbar conjunctiva. He made also a fourth hole at the limbus in the 1.30 o'clock

meridian so that air could reach the cornea. The bulbar conjunctiva more than 3 mm. from the limbus is mobile so that suturing here does not give absolute immobility to a contact glass.

Another authority has fashioned a projecting boss from the centre of the corneal part of the contact glass so that by seizing this with forceps he may adjust the position of the glass with the opaque limbal ring directly over the limbus immediately before X-ray exposure.

Yazujiam's combined limbal and scleral ring, is I think unnecessarily elaborate. It consists of the limbal ring of 12 mm. inside diameter, joined by 4 radiating bars of 6 mm. length with the scleral ring which has 22 mm. inside diameter and 24 mm. outside diameter. The cross bars may obscure the foreign body in both the lateral and antero-posterior views.

Skeoch's ring is made of stainless steel dental wire gauge 30 and welded with a lead bead. There are 3 sizes of internal diameter 24, 25 and 26 mm. respectively. The ring is slid into the upper and lower fornices with the lead bead just above the caruncle. The equatorial fit is checked by directing the patient to look to the right and then to the left.

Three X-rays are taken (1) lateral (2) oblique lateral. The ring tilts and the eye moves twice as far as the ring. (3) postero-anterior. The lead bead and ring afford shadows against which the density of the foreign body is compared.

The limbal ring.—Of all these marking devices the limbal ring, described by A. C. Norman in 1915, gives results which are reasonably accurate and of practical value in the majority of cases. The rings are made of silver wire 1 mm. in diameter and sizes varying in the internal diameter of the ring from 9 to 13 mm. are used. The ring which exactly fits the limbus is chosen and its immobility on the eye is assured by suturing it at 9, 12 and 3 o'clock to the conjunctiva at the limbus. For 3 mm. or so behind the limbus the bulbar conjunctiva is firmly attached to the episcleral tissues and does not ride easily over the sclera as is the case with the bulbar conjunctiva behind this zone.

A refinement which is, I think, helpful in the orientation of the eye is to fuse to the limbal ring 3 small silver loops at 9, 12 and 3 o'clock for the passage of the suture and the marking of these meridia, any deviation of which would be noted in the X-ray film and allowed for in assessing the meridian in which the foreign body lies. The technique is as follows :—

The eye is anæsthetized with pantocaine, and when much inflamed 2 or 3 minims of novutox are injected into the episcleral tissues at the limbus at 12, 9, and 3 o'clock. A silver ring of 1 mm. thickness and of a size chosen to fit exactly the corneo-scleral junction is stitched in position by sutures of 00 silk passing

through the conjunctiva at 12, 9 and 3 o'clock respectively. A drop of ol. parolein is instilled into the eye and a pad moistened in the oil is applied to the closed lids and bandaged in position. When possible the patient sits during X-ray examination. In some cases other wounds prevent this. During the first exposure he is directed to look with his uncovered eye forward, and for the second to look downward. For this purpose conspicuous marks such as red crosses or lights 5 cm. in diameter are placed on the wall for a sitting patient and on the ceiling for lying cases at the two points in which fixation of the eye is necessary during exposure. Each exposure is half the normal. To obtain a postero-anterior view of the orbit free from the dense shadow of the petrous part of the temporal bone the head is tilted slightly so that the occiput is down and the face up; the petrous shadow then falls over the antra. In an accurate postero-anterior radiograph the silver ring shows as a perfect circle; and in the lateral as a linear shadow. To obtain a perfect linear shadow in the first position of the lateral view Captain V. Lees, R.A.M.C., suggested that a mirror be attached to the X-ray apparatus in front of the unaffected eye and exactly at right angles to the X-ray cassette holder. The patient is directed to look at the reflection of his eye in the mirror.

Interpretation of radiographs.—The diameter of the silver ring is known and its measurement is checked on the X-ray film. Any radiographic magnification is noted. This has never been more than 1 mm., and when present allowance must be made for this fact. When an anode film distance of 30 inches or more is used parallactic magnification of the ring is negligible, and a schematic eye of 24 mm. drawn on the film is accurate enough. In the lateral view a line is drawn posteriorly from the centre of the ring and at right angles to it for about 22 mm. The upper and lower limit of the ring is used in turn as the centre of a circle whose radius is 12 mm. (*i.e.*, half the average length of an eye 24 mm.); with a pair of dividers set at 12 mm. the horizontal line is intersected by arcs described from the above centres. The point of intersection on the horizontal line is now taken as the centre of a circle with 12 mm. radius and this is described on the radiograph. A similar procedure may be done with the silver ring in the second position, that is, looking down. Likewise in the postero-anterior view a circle of 12 mm. radius is described around the centre of the silver ring. The ring is known to be at the limbus and so measurements may be taken from this on both the postero-anterior and the lateral radiographs.

Movement of the foreign body is the essential diagnostic feature. If the relationship of the silver ring image to the foreign body is unaltered in the first and second positions it may be presumed that the foreign body is moving with the eye. The radiographs with

the schematic eye marked upon them will indicate also the position of the object with regard to the centre of rotation. If the foreign body is in front of this it will apparently move with the ring, if behind against it—that is, a foreign body in the posterior half of the eye will lie at a higher level in the second position where the ring has rotated downwards.

The shadow of the foreign body might fall within the circles described and yet be outside the eye. The point is settled by the movement of the foreign body, which is generally absent when it is extra-ocular. There is, however, an exception to this in the case of a foreign body in Tenon's capsule, where slight movement may take place, but this is rarely as great as in the case of an intra-ocular foreign body. In such cases, therefore, if the foreign body shows a new relationship to the ring in the second position it is probably outside the eye. When the foreign body is clearly outside the limits of the circles described then it is certainly extra-ocular. The size of the foreign body is carefully measured on the radiograph. This will determine the length of the scleral incision necessary for its extraction.

Ahlbom's method is also good and simple. A circle of 26 mm. diameter is placed in front of and projected on to the eye. He uses teleradiography. The distance between the anti-cathode and the film is 2·75 m. and the projection is practically cylindrical and the error in magnification so slight that it can be neglected. To show very small foreign bodies he uses an aluminium disc between the occiput and the cassette and also employs the " bone free " technique.

(5) " *Bone-free* " (Sans squelette).—The osseous shadows of the orbital walls and floor of the skull sometimes obscure the presence of small intra-ocular foreign bodies particularly fragments of 0·5 mm., and even 1 mm. when the material of the foreign body is of a kind which does not give a dense shadow.

" Bone-free " exposures of the eye anterior to the equator may be obtained by turning the head partly to the side away from the affected eye and placing the X-ray tube at a tangent to the lateral orbital margin and the film at the inner canthus.

This procedure although helpful in difficult cases has its limitations.

(6) *Injections into Tenon's capsule.*—Efforts have been made to outline the sclera by the injections of radio-opaque substances into Tenon's capsule.

Air has been used. In some cases it remains for a day or two and has had to be sucked out. There is an instance recorded in the literature of the death of a rabbit from air embolism after injection into Tenon's capsule. Lipiodol has been used, and in the United States, diotrast.

Pirie has described the " subjective " method of localisation in a dark-adapted patient, the retina being stimulated by X-rays the shadow of the foreign body is projected. The fallacies of this procedure are that a retinal injury, such as the site of ricochet of the foreign body will produce a shadow and the shadow of the foreign body may fall upon the blind spot.

Biplane fluoroscopy is difficult and liable to inaccuracies and Thorpe's endoscope is a traumatic approach to localisation of an intra-ocular foreign body which is not justifiable in most cases.

Locators

In 1851 Aveling used a magnetised needle for the detection of the site of a steel foreign body such as a needle embedded in the soft parts of the body. The needle dipped and adhered to the skin at the exact point under which the foreign body lay.

Pooley and Pagenstecher in 1880 and 1881 working independently devised an apparatus also based on the principles of magnetic localisation. Their experiments showed that the depth of the foreign body might be inferred from the degree of deflection of the magnetised needle and a change in the position of the foreign body after the application of the magnet may be ascertained.

In 1894 Asmus added a mirror to such an apparatus to reflect the excursions of the magnetic needle on to a scale. Berman's locator described by Minsky (1944) is a rod in which are placed the equivalent of two transformers, one in the handle and the other at the tip, which is used to search for the foreign body. The primary coils are connected in series to a source of alternating current. Also in series, the secondary coils are connected through an amplifying unit to a voltmeter. When an alternating current is sent through the primary coils, a current is produced in the secondary coils by induction. The instrument has a means of equalising (balancing out) the voltages in the secondary coils so that the needle of the voltmeter will read approximately zero, since no current flows between them. If the coil in the tip of the rod approaches a magnetic metal (the foreign body), the balanced inductance is disturbed and a difference in potential takes place in the secondary circuit, which results in a flow of current. The amount of this current, shown by the deflection of the needle in the voltmeter, varies with the size of the metallic particle and with its distance from the tip. At the greatest point of deflection, therefore, the tip of the locator is immediately over the foreign body. Conversely, as the locator travels away from the foreign body, the deflection of the needle is lessened. Minsky states that he can estimate the depth of a foreign body, if its size and composition are known, by determining the distance necessary to give the

same reading, with the controls unchanged, in approaching a similar piece of metal. The instrument responds best to iron and steel, and less effectively to copper, brass, silver, aluminium, lead and their combinations. The differentiation of a non-magnetic from a magnetic foreign body is easily made when the needle of the voltmeter does not move at all.

Magnets

The best magnet is, I think, one shaped like a 6-inch shell with screw-in straight terminals; some are short and conical and others long and attenuated and about 2 to 3 mm. in diameter at the tip, the latter are more accurate and easily manipulated than the former which give a more diffuse field and may attract the foreign body to the side of the cone. This magnet is suspended over the head of the operating table. It should be so perfectly counter-balanced that the slightest move or tilt leaves it in place. The magnet itself should be so fitted on a ball-bearing setting that it may be tilted and turned easily to any angle, and fixed so by a clamp. A foot-switch is controlled by the surgeon to make and break the electric current. The patient's head is immobilized between sandbags and covered with a dark green linen mask with an aperture for the eye to be operated on. The main body of the magnet is enclosed in a sterile dark green linen sleeve. The magnet terminals are sterilized in A.C.10, rinsed in saline, dried with a sterile cloth before being screwed into the socket at the end of the magnet.

The advantage of this magnet is that the terminal tip may be applied with greater precision and kept so as long as necessary. Also it permits ophthalmoscopic examination of a vitreous foreign body by the surgeon to ascertain the magnetic nature or not of the foreign body.

Such a magnet is obviously desirable in military surgery where multiple wounds are present and on account of these the patient must lie on the table. It is even so in civil injuries when the eye alone is affected.

Solus Magnet. This has been used in military surgery, particularly in eye units operating in the field. It was intended for use as a portable magnet, and supplied with a strap for slinging over the shoulder of a medical orderly. The orderly has great difficulty in maintaining the end of the magnet at the desired site, and this procedure is technically unsatisfactory. Lt.-Colonel A. Lister effected a considerable improvement in this respect by mounting the magnet on a portable X-ray stand (Fig. 1).

On the upright of the stand there is a rachet adjustment to lower the tip of the magnet to the eye. As the movement of this is somewhat coarse I found it best to stop when the tip of the terminal was

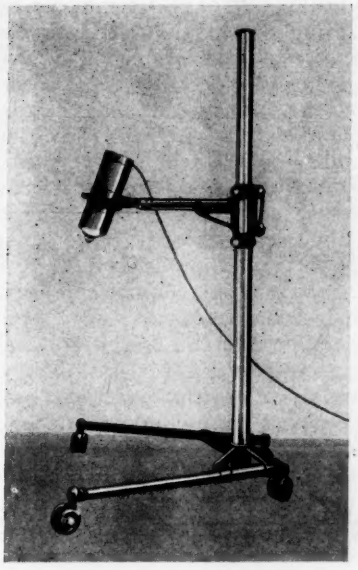

FIG. 1.

Solus giant electro-magnet mounted on portable X-ray stand. (*Reprinted from* Eye Surgery, H. B. Stallard, John Wright and Sons, Ltd. 1946).

2 or 3 mm. from the cornea or sclera and then by gradually raising the operating table the magnet terminal could be brought into contact with the cornea or into the lips of a scleral wound.

An improvement could be effected in this magnet by making the collar and framework holding the magnet of non-magnetisable metal and providing a clamping device to keep the magnet fixed for, when placed in an oblique position, it kicked.

Fig. 2 shows another type of counter-balanced magnet set in a hinged frame. The magnet is swung over the head of the operating table and held inclined at an appropriate angle.

The force inside the ring of Mellinger's magnet—that is, the operative field—is homogeneous all over. There is no preferred point of force and no dispersion of lines of force in the operative zone. It is possible to make with Mellinger's magnet terminals more delicate manipulations than with Haab's magnet.

The terminal held in the surgeon's hand must never be introduced into the operative field without the current having been switched on. The danger of placing the terminal inside the ring and then turning on the current is that it may become dragged suddenly on to the eye.

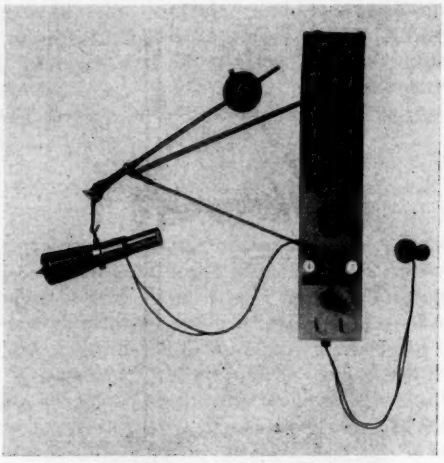

FIG. 2.

Counter-balanced giant electro-magnet. (*Reprinted from* Eye Surgery, H. B. Stallard, John Wright and Sons. 1946).

Mellinger's magnet has several disadvantages. The patient complains of an oppressive and confined feeling when his head is within the ring. The surgeon has often to exert considerable manual strength to hold still the magnet terminal in the magnetic field. If this is protracted it may impair slightly the steadiness of his fingers for subsequent stages in the operation. It is sometimes difficult to tie the scleral suture with the head inside the ring after extraction of a foreign body by the scleral route. In such cases the ring has to be swung clear of the head before this stitch can be tied, thus causing a short delay in closing the wound.

It is most important not to assume that because the application of the magnet causes no pain in the eye the foreign body is therefore non-magnetic. Had I believed this I would have lost 20 foreign bodies in the M.E.F. series of 102 cases and 19 in the B.L.A. series of 72. All gave rise to no pain on testing, and all (39) were extracted by the giant magnet, 36 by the scleral route and 3 by the anterior route.

The low magnetic quality of certain foreign bodies will be increased when placed in the field of a giant electro-magnet, but only to a certain extent, saturation being reached very quickly. For this reason many applications of the magnet are unnecessary for when this is done heat is generated in the wiring and the pulling power of the magnet becomes less. I have extracted a small magnetic foreign body on the fourth application of the magnet.

Kraus and Briggs recommend up to 50 applications for 2 seconds duration at 2 seconds interval. They comment that if it is not extracted with 50 applications it is useless to go on.

In one case in the B.L.A. series—Pt. J.—a metallic foreign body 10 x 4 x 3 mm. entered the sclera in the upper temporal quadrant of the right eye in front of the equator. The foreign body traversed the vitreous and part of it had perforated the sclera about the equator and beneath the internal rectus muscle. When the magnet terminal was placed over the wound on the temporal side the eyeball rotated temporally. The scleral wound on the temporal side was closed by sutures and covered with a conjunctival flap. The internal rectus muscle was then exposed, mattress sutures inserted in the muscle belly and its tendon divided. Diathermy was applied around the scleral wound through which part of the foreign body was projecting. Three scleral sutures were inserted on either side of the projecting part of the foreign body, the scleral wound was enlarged and the foreign body extracted by the magnet.

In one case of traumatic cataract when a magnetic foreign body 0·25 mm. was brought forward by the anterior route it became arrested in a fold of the torn lens capsule and would move no further. It was extracted by Arruga's forceps passed through a keratome section.

Surgical exploration

In some cases where it is doubtful from the radiographs whether the foreign body is just inside the eye, impacted in the sclera or in Tenon's capsule surgical exploration is indicated. The diathermy apparatus and the instruments necessary for incising the sclera and extracting the foreign body by a giant electro-magnet are available.

A tongue-shaped flap of conjunctiva and Tenon's capsule convex towards the limbus is cut and reflected posteriorly on its base, the axis of the flap being in line with the site of the foreign body and its apex 7 mm. or more in front of the site of the foreign body. The flap is held reflected by two sutures of 00 black silk clamped to the head towels.

Tenon's capsule is dissected from the sclera with a few strokes of a small muslin swab held in forceps. Adhesions of Tenon's capsule to the sclera, bands and nodules of fibrous tissue are guides to the site of the foreign body. The sclera is dimpled where it is cut tangentially or penetrated by the foreign body. The foreign body may be found inside a fibrous nodule on the sclera or it may be partly embedded and transfixing this structure. If the foreign body has passed into the eye the entry wound is circumvallated with diathermy and the sclera opened between sutures taking

care not to press the foreign body into the vitreous as it lies in the choroid or deeper layers of the sclera. Extraction is effected either by forceps or the electro-magnet. After closure of the scleral wound penicillin powder is lightly dusted in its vicinity and the conjunctival flap sutured with a continuous key pattern stitch.

Operation

The scleral (posterior) route was used in 45 cases in this series. In 37 of these the foreign body was extracted, in one it was removed with special forceps, and in the remaining 7 the foreign body was not attracted to the tip of the magnet. I have a feeling that in some of these with a better magnet and more accurate X-ray localisation the foreign body might have been extracted. Most of the cases in which the foreign body was not extracted occurred at a time when conditions were particularly crude and the field electrical generating set full of vagaries and inconsistent in its behaviour. The technique of the posterior route is fully described in the account of the M.E.F. series of 102 cases (*Brit. Jl. Ophthal., Vol. XXVIII, p. 105, 1944*).

Technical essentials are a tongue-shaped conjunctival flap convex anteriorly, the application of diathermy to the site on the sclera nearest to the foreign body and over an area of sufficient length to cover an antero-posterior linear incision 1 mm. longer than the greatest diameter of the foreign body, the insertion of a mattress scleral suture on either side of the scleral incision when about two-thirds of the thickness of the sclera had been cut through, and turning the head and operated eye so that the scleral wound lies uppermost before incising the choroid. The latter point is important in the prevention of vitreous presentation in the scleral wound. In no case was any vitreous lost. Nor did the diathermized area of the choroid and retina embarrass the extraction of a foreign body. Some surgeons believe that the foreign body may become entangled in the coagulum and so circumvallate the scleral incision with diathermy, leaving the area of incision untreated.

It was necessary to introduce the tip of the giant electro-magnet terminal into the lips of the wound so that its point touched the face of the vitreous but did not enter it. This was done by fine adjustment in the height of the magnet terminal.

The scleral suture was tied immediately after extraction of the foreign body and penicillin powder was lightly dusted into the wound.

Fifteen foreign bodies were extracted by the anterior route, 13 of them by the magnet and 2 by forceps.

In 12 instances there was no movement of the foreign body on applying the giant electro-magnet.

In some cases the foreign bodies were 0·5 mm. in size and impacted in the lens where they had produced a localised opacity near the equator and no appreciable visual disturbance. In these it was probable that they were magnetic for similar fragments removed from the face were so. It was decided to leave the fragments alone and to review the eye from time to time. It was undesirable to draw these through the lens capsule, and in any case it was improbable whether a magnet terminal placed on the cornea would have moved such minute particles of an alloy.

I do not believe that the bogey of retinal detachment after the scleral route extraction is any more probable and indeed less so than the risk of vitreous loss which is also quoted as a contra-indication to the scleral route method of extracting intra-ocular foreign bodies. With careful technique neither of these serious events is likely to happen.

If a retinal detachment occurs as a sequel to a foreign body it is due to the nature of the penetrating wound and the pathological changes this has caused inside the eye rather than any operative intervention of a careful and properly planned character.

Cases

Table D gives the units to which the wounded and injured men belonged. As might be expected the infantry and armoured troops were prominent in the battle casualties and R.E.M.E. and R.A.S.C. in accidental injuries in field workshops.

Table E shows the type of missile which penetrated and was inside the eye in the two groups of casualties (1) battle and (2) accidental.

It will be seen from this table that as in the M.E.F. series shell fragments accounted for the largest number of eye wounds with retained intra-ocular foreign body. Land-mine injuries were next common whereas in the M.E.F. series these were third in the order of frequency, hand grenade wounds being second. In Normandy the orchards and verges of the roads were heavily mined. The "shoe" mine was particularly difficult to detect. The charge was encased in a wooden box, a trip wire projected above the surface of the ground and was difficult to see. Soldiers walking or running over such mines often had a foot blown off, the line of traumatic amputation being at the ankle, and had an injury to an eye. In the case of one officer a fragment of the rubber boot which covered his amputated foot was blown into his right orbit and lay on the sclera, producing a severe concussion of the intra-ocular membranes on the temporal side.

There was a higher incidence of eye injuries from fragments of machine-gun bullet casing than in the M.E.F. series. This may

have been due to the severe fighting at close quarters in villages (Tilley, Villers-Bocage, Hottot, Caumont and others) where machine and Sten gun fire was used liberally in house to house attacks, fragments of bullet casing produced by ricochets spattered the exposed faces of the combatants.

TABLE D

Unit	Battle Casualty	Accident	Total
British Infantry ...	21	1	22
Canadian Infantry ...	5	—	5
R.A.C.	7	2	9
Canadian Armour ...	1	1	2
R.A.	3	1	4
R.E.	3	1	4
R.E.M.E.	3	2	5
R.A.S.C.	1	3	4
Royal Marines ...	1	—	1
R.A.F.	—	1	1
U.S. Engineers ...	1	—	1
Polish Infantry ...	5	—	5
Polish Armour ...	1	—	1
Polish Medical Corps	1	—	1
Dutch Infantry ...	1	—	1
Yugo-Slav Infantry...	1	—	1
German Infantry ...	4	—	4
German Navy ...	1	—	1
Total	60	12	72

TABLE E

Missile	Battle Casualty	Accident	Total
Shell	17		17
Hand Grenade	4		4
Machine gun bullet casing	8	1	9
Land mine	14		14
Booby trap	4		4
Mortar bomb	6		6
Bazooka bomb	3		3
Aerial bomb	2		2
Phosphorus bomb ...	1		1
Hammer and chisel ...		8	8
Tank track	1	2	3
Glass		1	1
Total	60	12	72

In the attack on Caen the German mortar fire was exceedingly heavy and so were the British casualties. Booby-traps were left in the breaches of abandoned German weapons and in vehicles and houses. The " bazooka " bomb was used against the armoured units and casualties from this missile also occurred in the infantry and engineers.

In the Western Desert Campaign we believed that an improved steel helmet of the German coal-scuttle pattern with side-pieces protecting the temporal region on each side would have saved a number of penetrating wounds of the sclera. There is no doubt that the number of serious head injuries would have been appreciably reduced. N.C.O.'s ordered the men to tighten the lace inside the British steel hat. This procedure raised it an inch or more on the head and so increased the exposure of the temporal fossa and the lateral side of the orbits.

As in the Western Desert engineers clearing mine-fields did not or would not wear a protective device over their eyes. Many severe injuries of both eyes from blast, burning and the spatter of gun-powder, earth and stone fragments could have been prevented by wearing thick salvoc goggles. Later in the campaign the eye pieces of captured German respirators were used to good prophylactic advantage.

The hammer and chisel provided the highest incidence of accidental pentrating wounds with retention of an intra-ocular foreign body.

Evacuation of wounded

In Normandy the tented field hospitals were about 8 miles behind the line during the battles for Caen and Caumont. We operated most of the time as a Casualty Clearing Station. The wounded came to us from the field and generally reached us within a few hours, or at the most within a day, of being hit. We could not hold them for more than a few days and as soon as they were fit to travel they were evacuated either by air or sea to the United Kingdom. At times it was possible to keep some patients until the injured eye was out of immediate danger. At first the conditions of work were crude, operating tables stood at odd angles on an uneven field, water was limited to one enamel bowl shared by four surgeons and changed once every two hours, gloves and gowns were reserved for intra-abdominal work, fitful illumination depended on the vagaries of a field generating set, primus stove sterilizers had irregular habits and unseasoned theatre orderlies slowed down the rate of dealing with a large number of casualties. It was surprising how quickly matters improved, and efficiency and good order became established.

I do not think that any eye casualty suffered from an operation under these conditions and during the 10 weeks we worked thus all the eyes which received conservative surgical attention settled down well after operation, none became infected and in none did removal of the eye seem likely to be necessary at a later date. This was just the fortune of war.

After the break-through at Falaise and the advance across the Seine, Picardy and Flanders I was transferred to the 108 (General) Hospital (2,000 beds) which was working on the outskirts of Brussels in a bottle-neck on the line of evacuation of casualties. Here in a separate pavilion there were 90 ophthalmic beds, treatment rooms and operating theatre suite. The volume of work was immense and until the lull that followed von Rundstedt's advance in the Ardennes we operated as a C.C.S. I was, however, allowed at times to hold seriously wounded eye cases for 2 or 3 weeks and

this was so after the Rhine crossing and until the end of the war in Europe.

In May, June and July, 1945, repatriated prisoners of war of many European nationalities, " displaced persons " and enemy prisoners required surgical attention for neglected wounds and were held until fit for discharge from hospital.

Clinical Facts

An enquiry was made about the distance of the explosion from the soldier. Whilst the majority of wounded were able to assess this some were unable to appreciate which of many missiles bursting near them caused the wound.

One man was wounded by an aerial bomb explosion 200 yards away whilst he was lying down and in 7 per cent. of shell wounds this missile burst more than 20 yards from the soldier. The majority were within this range.

Fifty per cent. of grenades and 34 per cent. of mines and booby traps exploded within a yard of the soldier.

The men were asked their position when hit and the direction from which the missile came. In some, but not all cases, such information was helpful.

Size of the missiles.

Maximum diameter less than 1 mm.	10
1 to 2 mm.	16
2 to 3 mm.	17
3 to 4 mm.	7
4 to 5 mm.	6
5 to 6 mm.	3
6 to 7 mm.	3
7 to 8 mm.	1
10 mm.	1
11 mm.	1

There were 6 cases of multiple foreign bodies in the eye and in 3 of these all the foreign bodies were removed by a single operation through the scleral (posterior) route. In the fourth case the foreign bodies were not magnetic. In one case there were two foreign bodies in the vitreous measuring 4 x 2·5 x 1 mm. and 4 x 1 x 1 mm. respectively; in another case 3 foreign bodies all measuring 0·5 x 0·5 mm., the third case 2 foreign bodies 1 x 1 mm. and 1 x 1 mm., the fourth 2 foreign bodies 5 x 4 mm. and 2·5 x 1 mm., the fifth 2 foreign bodies 3 x 0·5 and 0·25 x 0·25 mm. and the sixth 2 foreign bodies less than 0·25 mm. both situated in the lens cortex.

As in the M.E.F. series foreign bodies between 2 to 3 mm. in their maximum diameter were common and the majority were under 3 mm.

Age incidence.

18 to 19 years	3
20 to 30 years	57
31 to 40 years	8
over 40 years	4

Eye affected.

Right eye	35
Left eye	27
Both eyes	10

Site of penetrating wound.

(1) Through the cornea.

Upper temporal quadrant	5
Upper nasal quadrant	6
Mid-line between these quadrants	3
Centre of cornea	2
Corneo-scleral junction on nasal side	1
Lower nasal quadrant	6
Lower temporal quadrant	11
Mid-line between these quadrants	2

(2) Through the sclera.

Upper temporal quadrant	10
Upper nasal quadrant	4
Mid-line between upper and lower nasal quadrants	1
Lower nasal quadrant	6
Lower temporal quadrant	5

(3) Multiple—2. In one of these two penetrating wounds were in the lower nasal quadrant of the sclera and in the other there were three wounds in the cornea, 2 in the lower nasal and 1 in the upper temporal quadrant of this structure.

(4) Wound of entry not seen—9. In the majority of these exploration showed that the foreign body had entered the orbit and penetrated the sclera behind the reflection of the bulbar conjunctiva.

In this, the B.L.A. series it is evident that the site of the penetrating wound was commoner on the temporal side than the nasal, both in the cornea and the sclera, whereas in the M.E.F. series there was a high incidence of wounds in the nasal half of the cornea, particularly the lower nasal quadrant, and in the lower quadrants of the sclera.

Uveal Prolapse—7 cases. The nature and size of the missiles which caused the penetrating wound and prolapse is set out below.

Iris.

Shell	3 x 1·25 x 0·75 mm.	1
	5 x 4·5 x 1·5 mm.	1
	2 x 1·25 x 0·25 mm.	1
	3 x 2 x 0·25 mm.	1

Iris and Ciliary Body.

Phosphorus bomb	6 x 4 x 0·5 mm.	1
Land-mine	10 x 4 x 3 mm.	1

Ciliary Body.

Bullet casing	2 fragments 5 x 4 and 2·5 x 1 mm. ...	1

Choroid.

Aerial bomb	2·5 x 1·75 mm.	1

The two eyes in which there was prolapse of the ciliary body from a large fragment which traversed the vitreous and stuck partly through the sclera on the opposite side of the globe became quiescent for a few weeks but ultimately required excision. The others were saved.

Traumatic cataract.—34 cases. In 24 of the 34 cases the penetrating wound was in the cornea. In 7 of these the damage to the lens was slight. The size of the intra-ocular foreign body in these cases varied from 0·12 to 1·5 x 1 x 0·25 mm. In one instance it was 0·12 mm. and in another there were 2 fragments of aluminium alloy about 0·25 x 0·25 mm. deep in the lens.

The ultimate visual result in these cases was on the whole good. Two had 6/6 vision, one 6/9, another 6/24 before leaving hospital and no information about the others was forthcoming from the hospitals to which they were evacuated in the United Kingdom.

The remaining 17 cases had severe damage to the lens.

In 6 instances the lens was damaged where the foreign body passed through the sclera. Two of these showed a slight degree of cataract and in 4 it was severe.

The wound was not seen in 3 cases of traumatic cataract and cataract was bilateral in one case, one eye had a scleral wound and in the other eye the wound was not seen.

Vitreous haemorrhage.—The incidence of vitreous haemorrhage in the B.L.A. series was 44·4 per cent., that in the M.E.F. 48 per cent. and the proportion of slight and severe cases was nearly alike in the two series, the severe cases being slightly more in the B.L.A. casualties. Table H shows the incidence of slight and severe vitreous haemorrhage in relation to a corneal or scleral penetrating wound.

TABLE H

Vitreous Haemorrhage	Corneal wound	Scleral wound	Wound not seen	Total
Slight ...	4	3	2	9
Severe ...	3	20		23
Total ...	7	23	2	32

As might be expected severe vitreous haemorrhage occurred when the site of the entry wound was near the exit of a vena vorticosa, in the line of a long ciliary artery and in some cases when it traversed obliquely the pars plicata of the ciliary body. In such cases the sizes of the foreign bodies were from 2·5 to 6 mm. in their longest diameter.

Vitreous prolapse.

On arrival at hospital vitreous prolapse was present in 5 cases. In 4 of these it was through a scleral wound inflicted by foreign bodies 1, 2·5, 3 and 5 mm. in their longest diameter and in 2 of these cases the foreign body had also perforated the upper lid. In one case vitreous prolapsed through a penetrating wound of the cornea made by a 2 mm. foreign body.

Retinal detachment.

Retinal detachment was present in 2 cases. In both of these the entry wound was in the lower half of the sclera, in front of the equator and the retinal detachment and vitreous haemorrhage were in the vicinity of the wound.

In two instances when the vitreous haemorrhage was too severe to see the retina, some dark brown blood-stained inter-retinal fluid escaped when the choroid was incised for magnet extraction of the foreign body. So it is probable that retinal detachment was present in these cases.

I have no knowledge of the incidence of late retinal detachment in this series for it has been impossible after the war to trace more than a small number of them.

(Follow-up cards were sent with the notes of every soldier in this series. Out of 72 I received only 1 reply, and that from a general house-surgeon in a small north country hospital, and this contained no details. This was a similar experience to the Middle East series.)

Visual result.

It was impossible in this series to obtain facts about the ultimate visual result. During 1944 we operated as a casualty clearing station and as soon as a man was fit to be moved he was evacuated to the United Kingdom. As stated above neither follow-up cards nor letters about the wounded were answered.

Whenever it was possible for a patient to have his vision tested before evacuation this was done (in the Normandy campaign this examination was made in a tent). It is possible that in many cases the visual acuity improved later. Such records as were taken at the time of evacuation are as follows:—

	6/5	2 cases
	6/6	5 cases
	6/9	5 cases
	6/18	1 case
	6/24	1 case
	6/36	2 cases
	Counting fingers ...	2 cases
	Hand movements ...	8 cases
Perception of light.	Accurate projection ...	2 cases
	Inaccurate projection ...	5 cases
No perception of light.	... ...	2 cases

In the remaining 37 cases visual acuity was not tested because of evacuation at short notice and the impossibility of doing an accurate refraction on a patient with multiple wounds lying on a stretcher.

Excision.—Two eyes were ultimately excised. In each of these the foreign body had passed through the limbus of the upper nasal quadrant, traversed the vitreous and was impacted in the sclera of the lower nasal quadrant, the foreign body being partly inside the eye and part of it projecting through Tenon's capsule. In each case the foreign body was large, in one case it was 10 x 4 x 3 mm. and in the other 5 x 4·5 x 1 mm. In both cases after wound toilet, extraction of the foreign body and suture of the scleral wounds the eye settled down and remained so for a few weeks. I heard indirectly that the ophthalmologist in the Canadian Hospital to which these men were transferred considered excision proper on account of no perception of light, a soft eye and a wound in the ciliary region.

Endophthalmitis.—There were 2 cases of endophthalmitis which settled down. These received parenteral and subconjunctival penicillin.

There were no cases of panophthalmitis. How much this was due to penicillin powder dusted on to the exposed sclera around

the sclerotomy wound in the scleral route extractions it is impossible to say. The surgical team wore gloves and a non-touch technique was adopted. The post-operative course was uncomplicated by inflammation in all cases of scleral route extractions.

Associated with wounds in other parts of the body.—Wounds were present in other parts of the body in 51·4 per cent. in the B.L.A. cases. Multiple wounds included severe injuries such as open fractures of the femur, haemothorax, amputations, burns and serious head injuries. The nature of these is recorded briefly in the appendix.

The variety of multiple injuries due to hand grenades, land mine explosions, and booby traps conformed closely in both the M.E.F. and B.L.A. series.

Incidence of penetrating wounds of the eye with retained intra-ocular foreign body

In both the M.E.F. and B.L.A. series it has been difficult to obtain accurate statistics of the incidence of penetrating wounds of the eyes with retained intra-ocular foreign bodies in relation to eye casualties and to all battle casualties. Security measures often prevented a publication of numbers of casualties particularly in the M.E.F. When the German-Italian forces reached Alamein in June, 1942, many records at H.Q. Medical Services were destroyed. The transfer of wounded through several hospitals and the collection of cases requiring magnet work at three of these (the majority of such cases went to the 15th Scottish and the 8th General Hospitals and a few to the 6th General Hospital) made the keeping of accurate statistics impossible.

In the M.E.F. series there were 102 cases of a penetrating wound of the eye with retained intra-ocular foreign body out of 328 men with wounds within the circumference of the orbit and 110 with intra-cranial wounds affecting the visual pathways. In some of the latter the orbit and the eye were also injured.

Scott and Michaelson collected statistics of the terminal phase of the Western Desert campaign and found 78 cases of intra-ocular foreign bodies out of 301 eye battle casualties, 190 of which had penetrating wounds of the eyes. In 58 of this series both eyes were injured.

Dansey-Browning in the Italian campaign had 24 cases of intra-ocular foreign body out of 129 eye casualties in whom 148 eyes were injured. He considers that eye casualties were 2·5 per cent. of the total battle casualties.

In this B.L.A. series there were 72 cases of retained intra-ocular foreign body in 335 battle casualties and 62 accidental injuries of the eyes.

The statistics given by Lt.-Colonel A. Lister in his Summary of Ophthalmic work in 21 Army Group from June 5 to September 30, 1944, are 2,188 eye casualties of which 1,440 were due to direct enemy action, 480 (about 30 per cent. of battle casualties) had a penetrating eye wound, 157 had intra-ocular foreign bodies, 51 (about 30 per cent.) were removed.

From October to December, 1944, eye casualties due to direct enemy action were 595, and were 3·8 per cent. of all casualties in October, 3·1 per cent. in November, and 0·8 per cent. in December. There were 215 " battle accident " casualties in this same period. Twenty per cent. of the eye casualties had penetrating wounds of the eye and 33 per cent. of these had intra-ocular foreign bodies, only 25 per cent. of which were removed.

Whiting and Goulden comment that in July, 1916 (during the 1914-18 war) they had 30 cases of retained intra-ocular foreign body in this month, 5 cases occurring on one day and 13 in a week. They also remark that in France at this time a considerable number of intra-ocular foreign bodies were non-magnetic.

Cridland gives the incidence of penetrating wounds of the eye with retained intra-ocular foreign body in civil practice in 3 large industrial areas as 1 in 977·9 of all eye cases and 1 in 299 of accident cases.

Summary

The clinical facts of 72 cases of penetrating wounds of the eye with retained intra-ocular foreign body in the B.L.A. are surveyed. Methods of X-ray localisation and types of giant electro-magnet are discussed. In military surgery under field conditions such apparatus has to be simple for the former has to be used expeditely by men with no special knowledge or training. There is indeed little time for such work when dealing with almost daily convoys of several hundred wounded. Our average time for a case was three minutes for suturing a limbal ring in place, about 10 minutes for the X-ray and 7 to 12 minutes for the operation of extraction of the foreign body by the scleral route.

The scleral route for extraction is indicated in the majority of cases and is simpler and less traumatic than the anterior method. With careful technique the danger of vitreous loss is negligible. This complication did not occur in this series. Retinal detachment is mentioned in the literature as a complication of the scleral route operation. I think this catastrophe is unlikely to occur as a direct result of the operation when diathermy has been used around the incision in the sclera and intra-ocular membranes. It may have happened in cases where diathermy was not used but there is no comment on this point in the literature. Retinal detachment is

more likely to be due to the pathological changes induced inside the eye at the time of injury.

In this series 69·3 per cent. of foreign bodies were extracted, 51·3 per cent. by the scleral route and 18 per cent. by the anterior route. Other authors including 21 Army Group Medical H.Q. state that about 30 per cent. of modern war missiles are extracted by a giant electro-magnet but they do not differentiate the incidence of success by either the anterior or posterior route. Many reported failures by the anterior route might not have been so if the scleral route had been properly tried.

With better X-ray facilities for localisation and a better magnet I feel that the figure of successes in this B.L.A. series might have been higher. For extraction of the feebly magnetic alloys of war missiles it is essential to bring the terminal of a very powerful electro-magnet into the lips of a scleral incision placed as near as possible to the foreign body.

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"BLUE HALOES" IN ATEBRIN WORKERS

BY

IDA MANN

OXFORD

I AM deeply indebted to Dr. H. Wyers for having called my attention to this condition and for the opportunity of examining the cases described.

Since the introduction of atebrin* for the treatment of malaria and its consequent manufacture on a large scale, certain pathological conditions consequent on handling it in bulk have become known.

* Atebrin is 2-chloro-5-(·ω-diethylamino-α-methylbutylamino)-7-methoxyacridine dihydrochloride and is also known as Mepacrin (B.P.) and Quinacrin (U.S.P.).

The commonest appear to be erythematous and papular skin eruptions on exposed parts, with puffiness of the eyelids, lacrimation and pain over the frontal sinuses. These symptoms occur in certain sensitive individuals who are usually rendered thereby unsuitable for work with the drug and are transferred to other processes. Among those workers, however, who do not show this special sensitivity and therefore continue in the work, a yellow discoloration of the skin and conjunctiva and a curious corneal condition may develop. The present note concerns the eye condition of six workers engaged in the production of the drug and its compression into tablets. This eye condition is not a scheduled industrial disease and so is not compensatable in the ordinary way.

Ocular signs and symptoms.—The patients, healthy men aged 28, 35, 36, 49, 53 and 66 respectively, had been working in an atmosphere which often contained for short periods clouds of very fine atebrin dust. One had worked in the plant for a year, two others for 10 months. All considered that they were not particularly sensitive, and experienced no dermatitis or other discomfort. They wore protective clothing, goggles and masks, but the dust was so fine that in spite of this they soon noticed yellow staining of the conjunctivae and skin, especially of hands, head and neck. The men worked 9 hours a day for five days a week and after some weeks or months they all noticed that when looking at a small source of light at night they saw a blue halo round it. There was no ocular pain, no lacrimation or photophobia. All insisted that the halo was mainly blue, that for a light one metre away it began approximately two inches from the light and was about three inches wide. It was darker blue near the light and pale blue at its outer edge. If the light was placed at six metres, faint yellow, green and reddish-brown bands appeared outside the blue ring. These were usually not noticed until asked for, the blue ring being much the brightest. All the men stated that their visual acuity was unimpaired and on examination it was found to be 6/6 in all the eyes. They could see the blue halo at any time by looking at a light and there was never any pain. Two men stated in addition that their nostrils were sore and occasionally bled.

Slit-lamp appearance.—On examination the condition in all six patients was similar. In some it was more severe than in others.

In the fully developed condition there was a yellow discoloration of the conjunctiva in the interpalpebral space (Fig. 1) and in addition a curious corneal condition, just visible macroscopically as a slight dulling and yellowing of the cornea. A slit-lamp, however, resolved these appearances as follows :—

1. The conjunctiva showed a diffuse pale yellow stain in the interpalpebral space only. The vessels were not engorged nor was there any increase in secretion. At the limbus in the exposed portion and also just under the edge of the lower lid, but not at the upper quarter of the limbus, there were aggregations of minute dark brown dots. These are seen in Figs. 2 and 3. They resembled very much the pigment dots seen here in Chinese and other lightly pigmented races and in some Southern Europeans, but they were rather darker, denser and more finely particulate than these. They appeared to be an actual deposit, possibly picked up by cells (macrophages) and lying in their cytoplasm or possibly merely existing as a fine surface dust. They were not movable and could not be washed off.

2. The cornea showed a remarkable change. The whole surface, even that covered by the upper lid, was peppered with very fine dust-like particles. These appeared dark yellowish brown by direct illumination, and quite opaque by transmitted light. The size of the particles varied but at a rough estimate with the slit-lamp they were from 5-10μ in diameter, *i.e.*, about the size of, or a little larger than, the nucleus of an epithelial cell.* There was no disturbance of the corneal reflex, the surface being perfectly smooth and bright, so that it seems likely that the particles were intracellular or at least situated in the substance of the corneal epithelium. None was seen deeper than this and most appeared to be in the surface layer of cells.

Across the lower part of each cornea was a series of wavy yellow lines, like a very marked Hudson's line, but wider and brighter than this and branching. This is seen in Fig. 3. The lines were composed of very closely aggregated dots similar to the others over the rest of the cornea, but closer together and much brighter yellow. There was also a more diffuse yellow colour across the cornea in this region, resembling the pale yellow staining of the conjunctiva and suggesting a substance in solution.

The substantia propria was entirely normal, as were the internal parts of the eye. Fig. 4 shows the slit-lamp appearances. The corneal band is on the left and shows the yellow colour of the massed deposits, the general surface speckling and the normal substantia propria. The band of light reflected from the iris shows the yellow dots to be opaque or dark brown on retro-illumination, and to the right of this they are visible as greyish dots seen by scattered light (total internal reflection).

Course and prognosis.—The history of one patient throws some light on the time sequence and on the prognosis. This man,

* The nucleus of a corneal epithelial cell measures roughly 5×7μ and the whole cell 10×18μ.

FIG. 1.

Macroscopic appearance of eye of atebrin worker, aged 66 years.

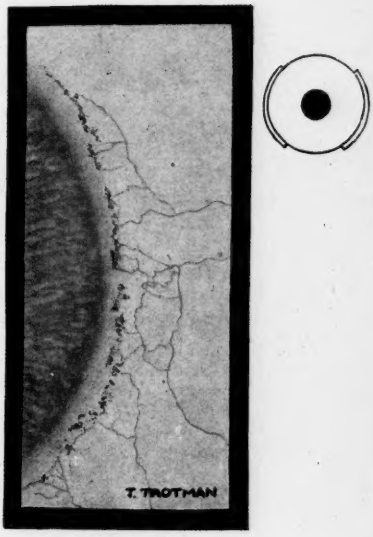

FIG. 2.

Slit-lamp appearance of the limbus of a patient, aged 35 years. (Inset diagram shows areas of distribution of the pigment dots).

FIG. 3.

Composite slit-lamp drawing of cornea of atebrin worker aged 49 years, showing innumerable yellowish dots and aggregations of these in the lower part. (The dots are not drawn small enough).

FIG. 4.

Slit-lamp appearance of a portion of the cornea shown in Fig. 1.

J.D., aged 35 years, was first employed on the work two years ago. After a little less than a year he noticed the blue haloes and that the whites of his eyes were yellow. He was then put on light work where he was not exposed to the chemical. After two months of this the " blue rings " disappeared and he considered his eyes quite normal. After a further month, during which he remained well, he went back to work with atebrin. He remained well for six months and then began to notice faint haloes. These became intensified by nine months, at which time I examined him, but he stated that the rings had not yet reached their previous intensity. He showed the limbal deposits of brown dots and his corneae were very faintly and finely peppered, but there were no yellow lines and the whole appearance was much less marked than in most of the other patients. Without a slit-lamp he would have been passed as normal.

This case seems to show that the condition may be very slow in developing and that if the patient comes off the work it clears away completely, only very slowly coming back on re-exposure. No permanent damage appears to result and the visual acuity is unimpaired throughout. The time for disappearance of the rings after stopping the work is about two months and the time taken to reappear (and to appear originally) is six to nine months.

Differential diagnosis.—The complaint of haloes round lights always arouses a suspicion of glaucoma, but in all these cases the tension was normal, the discs not cupped and the visual acuity 6/6 with full fields. The absence of any signs of glaucoma and the presence of the appearances described above should make the diagnosis simple. In addition, the patients have always been exposed to atebrin dust for some time before the symptom is noticed.

Discussion of pathology.—It would seem that the punctate deposit on the cornea is the cause of the haloes and that they are produced by a diffraction effect. Three points of interest present themselves for investigation, namely, the route by which the deposit reached the cornea, its nature and its position.

Since the men were exposed to atebrin dust two routes to the eye were open, either the direct surface involvement, *i.e.* the dust settling on the eye, or the systemic route, the dust having been inhaled, swallowed or absorbed through the skin and passed to the eyes *via* the blood stream or the lymphatic system.

In order to decide this, two observations were made, one on man, the other experimentally on rabbits. In the first, two other men, aged 27 and 36 respectively, were examined. They were volunteers in an experiment on the effects of atebrin administration in normal people. They had both taken 100 mg. a day by mouth and occasionally more, for seven months and were still taking it when seen. Their

hands and faces and skin generally showed a pale yellow staining, but their conjunctivae were perfectly normal as were also their corneae. They both stated that they had no symptoms, that they had never seen blue haloes, that their sight was unaffected (it was 6/6 right and left in both) and that at no time had the whites of their eyes been yellow. This would seem to indicate that the corneal condition in the atebrin workers is due to direct surface contamination with very fine dust, which gets embedded in the corneal epithelium and is only slowly cast off.

A second observation to confirm this was made on three rabbits. It was found that atebrin dust blown directly on to their eyes with an insufflator twice a day produced a similar slit-lamp appearance in six days, with no systemic effects.

It would therefore seem certain that the corneal condition is caused by direct surface contamination with atebrin.

The particles seen with the slit-lamp cannot, however, be atebrin itself, since this is completely soluble in the tears. Their exact nature is speculative, but it seems possible that they are precipitates of an insoluble breakdown product of atebrin formed in the cells of the corneal epithelium which have absorbed the atebrin itself in solution in the tears. We have some evidence that selective absorption of substances from the tears does take place, but so far as I am aware, no previous instance of intra-cellular precipitation of such an absorbed substance is known.

In order to investigate the exact position of the particles, one of the rabbits mentioned above was killed at the time when the slit-lamp appearance of the cornea resembled that in man. Microscopic examinations of scrapings and flat preparations were made of the corneal epithelium. Yellow granules in the cytoplasm could be seen in unfixed specimens, but fixation with saturated mercuric chloride solution in absolute alcohol and staining with Leishman's stain gave the best results. Granules were then visible, stained faintly blue, and lying well within the cytoplasm of the epithelial cells. Each individual granule was very small and amorphous. Aggregated they formed a granular blue mass either encircling the nucleus or lying beside it, if it happened to be eccentric in the cell. The granules were optically inactive. It is obvious that the opaque yellow dots seen with the slit-lamp are not the individual granules but the whole aggregation within the cell containing them. The nature of the granules is not known. It has been suggested by Dr. H. J. Barber of the Research Laboratories, May & Baker, Ltd., in a personal communication to Dr. Wyers that they may be composed of 2-chloro-7-methoxyacridone, an exceedingly insoluble substance which is slowly formed by hydrolysis of atebrin. He considers that this substance might well become fixed within cells

and stain them, since both atebrin itself and methylene blue to which it is related have marked staining properties. It is interesting to note that 2-chloro-7-methoxyacridone does not occur in the formula for acriflavine and that no complaints of haloes or of corneal staining have come from acriflavine workers. It does occur, however, in the newer 5-aminoacridine and workers in this material should be watched for development of any signs or symptoms.

That the substance composing the granules is in some way derived from the solution of atebrin in the tears and is not deposited in the cells direct from the dust is indicated by the fact that the granules occur all over the cornea, even under the upper lid. This distinguishes the appearance from that due to a chemical injury with some substance (*e.g.*, mustard gas vapour) which acts directly on each epithelial cell it touches, without going into solution in the tears first.

Once the granules have appeared in the cells they do not redissolve but remain until the cells are cast off and repaired in the ordinary course of events. The affected cells tend to become pushed by the movements of the lids into a more or less horizontal band just below the centre of the pupil (position of Hudson's line) and during the process of recovery (in rabbits) can be detected longest here.

That more severe contamination than that received by the six patients described might produce more severe and permanent results than they displayed was suspected. Two of the rabbits were therefore exposed to large insufflations of atebrin powder twice daily. One of them developed oedema of the substantia propria of the cornea, shedding of the epithelium, marginal vascularisation and iritis. The other showed slight iritis and no corneal oedema. In both the diffuse yellow colour of the atebrin in solution appeared to extend through the whole thickness of the cornea and even to stain the endothelium. Complete recovery took place in both cases on stopping the insufflations.

The nature of the haloes seen by the patients.—The halo is obviously a diffraction effect due to the opaque granules in the epithelial cells. Such haloes are always blue on the inside and red on the outside of the ring. The blue, being brighter, is more readily noticed. Duke-Elder (Text Book of Ophthalmology, Vol. I, p. 801) states " The nature and site of the structures causing the halo can be deduced from the angular diameter of the rings . . . The radius of the halo, divided by the distance of the nodal point of the eye from the light gives the tangent of the angle." An attempt was made to measure the angular diameter of the haloes in this way in three of the men, using a monochromatic filter (transmitting 5500 Å). The results lay between 3° 17 min. and 3° 52 min.

Extreme accuracy of measurement was not possible, but the result indicates that the particle size is roughly a little smaller than a normal epithelial cell. The usual angular diameter of the haloes in glaucoma is 7°—12° and here we know that the size of the droplets causing them is that of a swollen oedematous epithelial cell. Haloes due to mucus on the corneal surface are larger still (up to 14°).

An attempt was also made to calculate the actual particle size by measuring the haloes seen with monochromatic filters (5500 Å and 5400 Å) and using the formula

$$d = 1{\cdot}22 \times \frac{\lambda l}{r}$$

where d = diameter of particle
r = radius of first dark ring in cm.
l = distance of eye from screen
λ = wave-length in μ

the actual measurements were difficult to do accurately and the results of a number of trials gave values for d varying between 7μ and 11μ. This, though not conclusive, points to an intra-cellular cause for the diffraction effect and would seem to correspond with the massed amorphous particles.

The investigation of this new industrial disease is chiefly of interest from the physico-chemical point of view and from the importance of the differential diagnosis of glaucoma which its history suggests.

Summary

A new industrial disease of the cornea is described in atebrin workers. It appears to be caused by an intra-cellular deposit of an insoluble derivative of atebrin.

Its only symptom is the seeing of coloured haloes (mostly blue) round lights. Its prognosis is excellent on removal from contact with atebrin dust.

SUBJECTIVE "LIGHTNING STREAKS"*

BY

R. FOSTER MOORE

LONDON

IN the October, 1935 number of this Journal I published a series of cases of a symptom complex under the above title (p. 545), and later, an additional series in *The American Journal of Ophthalmology*

* Received for publication, November 21, 1946.

(November, 1940, Vol. XXIII, p. 1255). Professor F. H. Verhoeff has published an excellent account of them in *The American Journal of Ophthalmology* (March, 1942, Vol. XXV, p. 265).

My reason for reverting to the subject is, that I am now able to add the personal experiences of the symptoms in three ophthalmic surgeons, which may, on this account, be thought to have particular value; they compel me to modify, and enable me to amplify my former description in several prominent particulars.

Professor Verhoeff has been good enough to send me a detailed and lucid account of his experiences, and to make suggestions which, coming from him, have unusual authority; Dr. J. Rutter Williamson sends me an excellent description of his observations, and these have a value of their own from the fact that he sees with one eye only; and since my last paper I have myself become a subject of the "Streaks." I propose to describe the condition in the light of the above additional evidence.

This is a symptom complex which occurs after middle age—the youngest of my patients was 42—most usually in myopes, and perhaps more commonly in women.

It consists in the association of the development of flashes of light with the simultaneous appearance of spots before the eyes. I previously expressed surprise that patients should be sufficiently concerned to seek advice on account of these symptoms alone, as they sometimes will, but having experienced them myself, I can understand that they should arouse a degree of curiosity, if not of actual anxiety as to their significance, for the phenomenon is quite a striking one.

The most conspicuous feature is the sudden appearance, without obvious cause, of bright or brilliant flashes of light.

Various similes have been made use of in describing them, but as "lightning" is the most usual I adopted it.

Amongst other similes are the following:

J. R. W. says "On the evening of November 25, 1942, I noticed flashes after switching off the light to go to bed. I thought there must be a defect in the "black-out" showing searchlights, but investigation proved negative."

F. H. V. says "I have found on close questioning that patients all agree that what they see are streaks."

For myself, were I experiencing the phenomenon as a quite unfamiliar sight, I feel no doubt that I should have compared the streaks to lightning.

Others have suggested "shooting stars"; "fireworks"; "headlights," etc.

Few have commented upon the colour, but J. R. W. describes a "bright bluish yellow" flash: one person spoke of "silver lightning,"

and one compared the flashes to fire-flies, but said they were too silvery in colour.

They are of momentary duration so that detailed analysis of them is not possible; they are very bright and travel from above down. They are curved as, I fancy, lightning never is; they do not exhibit the zig-zag feature of lightning.

J. R. W. says "It commenced in the upper part and ran downwards, always in a perfectly true semi-circle"; this too is true of what I see. They may be seen at any time, though naturally they are more conspicuous in the dark; they occur whether the eyes are open or closed.

Position of the streaks.—My original statement as to the part of the field in which the streaks are seen, was that they were "almost always to the outer side of the eyes" and whilst this is an accurate statement they certainly do occur at other positions.

F. H. V. says:—"The streaks in my left eye began about October 30, 1937. For a short time they occurred in all quadrants. In 1939 I could elicit them only in the outer quadrant. On October 19, 1942, I first observed the streaks in the right eye; at first here too they were in all quadrants and I could sometimes get an almost complete circle of light; all but the lateral streaks, however, ceased to occur in about a month. At the present time (May 24, 1946), I can still elicit a temporal streak in either eye."

J. R. W. says:—"It was situated to the outer part of the field (he having only one seeing eye, the left). On its disappearance there swept in from the right, *i.e.* from the nasal side, a sort of secondary flash, a wavy cloud of pearly colour, very like what is seen with the ophthalmoscope sometimes, in a detached retina. This wavy appearance was trembling, as if a very thin cloud disturbed by a current of air; the whole was of course of extremely brief duration. Very rarely did one see a straight flash, and then it was very small and appeared on the nasal side of the field of vision.

My own experience is that the streaks are seen only on the rather extreme temporal side, and do not transgress a central vertical limiting line, but at times I have seen what I can only describe as faintly luminous circular areas to the nasal side.

It can be said that the streaks may be seen in any quadrant of the field, but that they are much more often referred to the temporal side, and that here they persist much longer than elsewhere.

Movement of the eyes. I am surprised that in my former account I had not elicited that the flashes are only seen on movement of the head or eyes, a fact which is pointed out by Prof. Verhoeff. Had I at that time been the subject of them, I could not have overlooked the fact; most folk are agreed that they can produce them at will by sudden movement of the eyes.

Verhoeff says:—"I can elicit both streaks by quick rotation of

my head. This of course causes an ocular rotation to the opposite side, so that the resultant is simply a sideways motion of the eye as a whole."

J. R. W. says:—"I could produce it at will by moving the eye quickly to the left."

For myself I can say that while the eyes are at rest the flashes are never seen, and that I can elicit them, not with certainty but quite frequently, by sudden movement of the eyes.

It is unnecessary to labour the fact that movement is necessary for their production, the only point upon which I have some doubt is as to whether movement of the head will do so; I think it likely that it will, though I have not been able to satisfy myself as to this.

Verhoeff's explanation (referred to later) of the method of production of the streaks clearly calls for movement, whether of the head or eyes or both.

It is quite clear that the streaks do not occur with the eyes at rest.

Unilaterality. I find that in three cases only of my first twenty-six was the condition bilateral. In Verhoeff's case streaks appeared in the second eye about five years after the first; he says, with true prescience, "probably you will later get streaks in your other eye," this occurred just a year later.

I think it likely that most cases become bilateral in time.

Persistence. My original statement that the streaks persisted for "varying periods up to two or three months" needs revision.

Of the present three observers F. H. V. tells me (May 24, 1946), "The streaks have persisted about nine years in my left eye, and about four in my right; I still can produce them at will in both eyes, but only in the outer field of each."

J. R. W. says:—"They only lasted in their original brilliance for six weeks or so; after two months I occasionally see the semi-circular flashes but not brilliantly illuminated as before."

For myself, they first appeared in the right eye on October 17, 1943, and in the left eye on October 20, 1944; I still see them in the temporal field of each eye, *i.e.*, after three years in the right and two in the left eye; they are less obtrusive than formerly and I think occur less frequently, though no doubt one has got used to them and notices them less.

In view of the above it is clear that one can put no limit to the period for which they may occur, and it seems likely that, in some cases at least, they may persist indefinitely, especially in the temporal fields.

The association with vitreous opacities. Of the close relationship between the occurrence of these streaks and the simultaneous development of vitreous opacities I have no doubt.

It may well be that the patient has been familiar with opacities for many years, and in this case the development of streaks is

heralded by the sudden appearance of a fresh crop of them, or it may be that the two, the streaks and the opacities make their first appearance at the same time, *i.e.*, within a few hours of each other; in any case the association is very constant and I do not think these characteristic streaks occur without the development of a crop of opacities.

F. H. V. says:—" My vitreous opacities are much greater than they were before the streaks first appeared."

J. R. W. says " In daylight one was constantly seeing showers of black spots in a smoky environment and these moved across the page when reading."

For myself, as a low myope, I have been familiar with muscae for many years. On the evening of October 17, 1943, whilst out walking, I noticed a new, rather conspicuous unfamiliar spot, in the lower temporal field of the right eye, it was oat-shaped and of a rather golden colour; twenty four hours later I saw, for the first time, bright flashes, running from above down, curved, vertical in direction and well to the temporal side.

On October 20, 1944, flashes, having the same character, suddenly appeared to the temporal side of the left eye, and in the evening, a shower of dark opacities appeared.

The immediate cause of the streaks. I believe Verhoeff's explanation of the immediate cause of the streaks is probably the correct one; he attributes them to a shrinking and partial separation of the vitreous which then impinges upon the retina on movement, he says—

" To explain the more frequent occurrence of the streaks in the outer field, it is necessary to assume that the separated vitreous is more apt to strike the nasal retina, or that the sentient part of the retina extends further forward on the nasal side, or that both of these conditions obtain. Since the vitreous is asymmetrical, in the sense that the disc is nasal to the posterior pole of the eye, the separated vitreous would be nearer to the retina on the nasal side, and it is, of course, a known fact that the visual field extends furthest on the temporal side."

At a later date he writes:—" I can elicit both streaks by a quick rotation of my head—this fact confirms my view that a streak is due to the impingement of the separated vitreous upon the retina. You should try again to elicit the streak in your eye by a quick rotation of your head."

Up to date, I have come across no case which causes me to modify my belief that the streaks have no sinister meaning, either at the time, or, what is more important, ultimately.

A SURVEY OF THE RESULTS OF LACRIMAL STRICTUROTOMY*

BY

IVOR LLOYD

BRADFORD

ALTHOUGH the writer knows of no series of published cases illustrating the point, it is well recognised that the treatment by probing of epiphora due to disease of the lacrimal duct is extremely unsatisfactory. Ainsler has even said it may be easier to cure a detachment than a simple epiphora.

Stricturotomy for the relief of obstruction at the neck of the lacrimal sac is an established technique in French clinics. It is associated with the names of Poulard, Hartmann and Bastan.

English surgeons have not been interested to any great extent in the procedure and there do not appear to be publications of the results of a composite series of stricturotomy operations.

The writer, therefore, decided to give the method a trial on a reasonable number of cases, both from the point of view of verifying the results of the French ophthalmologists and because it presented interesting possibilities.

Method

The French method, used in the Hôpital Lariboisière, and explained with great clarity by Bastan, consists of opening the lower canaliculus with a Weber, Dugast, or similar knife, for 3 mm., and then dilating the canaliculus with a number 3 sound; a knife with a bent handle is used where there is undue projection of the eyebrows. The stricturotomy knife was then passed down into the sac and engaged in the neck of the duct. It was then verticalized, after which the edge was rotated forwards through an angle of 45° so that it faced somewhat forwards to prevent cutting the lower part of the canaliculus at its opening into the sac. Gum-elastic sounds from number 11 to 14 were then passed into the duct and the largest one left *in situ* for 10 minutes. Dilatation was continued at intervals of four to six weeks; the largest viable sound again being allowed to remain *in situ* for 10 minutes to stretch the opening.

The writer found that, with practice, the canaliculus could be dilated sufficiently to allow the passage of the knife with a slight or negligible slit. This was, in fact, preferable, as there was a considerable risk of occlusion of the punctum and/or the canaliculus from scarring if it was cut with a knife.

Dilatation was performed every two weeks for two months and then discontinued unless indicated by a return of symptoms.

* Received for publication, November 29, 1946.

Analysis of the Cases

There were 31 patients which involved 33 stricturotomies. In order to give the method an extensive and searching trial a wide variety of types were included, the only exceptions being very old subjects or those in whom there was an excessive amount of purulent regurgitation. The ages of the patients were between 20 and 55 years. The duration of the symptoms averaged 2 years, although one or two patients had had epiphora for 10 years or more. One case was the result of extensive burns of the face which produced scarring of the lids and caruncle, but the canaliculi remained patent.

Mucoceles were present in four cases, and twelve of the patients had chronic low grade muco-purulent infection of the lacrimal passages. Ten of the patients had bilateral obstruction, and in two of them the bilateral operation was performed.

In all cases the condition of the nasal passages and sinuses was investigated.

Lipiodol X-ray photographs of the lacrimal passages were taken in some cases before and after the operation in order to determine the effects of the stricturotomy. It is regretted that this could not be done in all of the cases owing to the pressure of work and shortage of films in the war period.

Results

The French have claimed 100 per cent. cures in cases with no bony obstruction and 70 per cent. in those with bony obstruction. When pus or induration was present the results were correspondingly 3 to 7 per cent. less favourable.

Four of the writer's cases could not be traced later, so that the effective total of stricturotomies for analysis was 29.

Complete cure resulted in 15 of the patients (52 per cent.); "improvement" was obtained in 7, *i.e.*, patients considered the result of the treatment worth while. The percentage of symptomatic relief satisfactory to the patient was therefore 76 per cent.

There were seven failures. An analysis of these showed the following details:—

1. Impassable stricture, probably bony. This is unfortunately not diagnosable pre-operatively.

2. & 3. Very tight strictures in which the stricturotome was passed with difficulty, dilatation being impossible later. Complete cure was obtained in both by the dacryocystorhinostomy operation of Toti.

4. One case was successful from a surgical point of view, and the sac and duct syringed through quite easily five months after the operation, but despite the absence of any other abnormality of the lacrimal passages the epiphora recurred three months later.

5. In one subject infection was a feature with moderate mucopurulent regurgitation. The operation of stricturotomy and subsequent dilatations kept the epiphora and infection in check, but they recurred at the termination of the treatment.

6. The patient with the scars due to burns was shown to have a medium sized mucocele on radiological investigation, but stricturotomy was unsuccessful as a lacrimal abscess developed shortly after the treatment had commenced, and the method had to be abandoned.

7. As a matter of interest and to produce visual evidence of the presence of a stricture, the writer performed an open stricturotomy on one subject. Continuous dilatation was maintained for a week after the operation by a bougie, by which it was hoped to avoid periodic dilatation later. Although the minimum of trauma was inflicted and the sac was closed with very fine cat-gut sutures through the superficial layers only, the subsequent scarring at the lower end of the canaliculus and in the sac led to a return of the epiphora some months afterwards.

Discussion

The operation of stricturotomy has many advantages over the usual methods of treatment of lacrimal obstruction.

It can be performed in the out-patient clinic, thus avoiding the necessity for admission to the wards of a hospital. It is a relatively minor operation leaving no residual unsightly scarring of the face. If the method fails it does not prejudice the exhibition of any other surgical procedure on the lacrimal passages. Finally, it is of especial value in cases where the obstruction is of a fibrous type in which ordinary probing so often proves unsuccessful.

The writer, in agreement with the French clinicians, maintains that the results are as good, if not better, than those obtained with other methods.

On the other hand, the operator must be prepared to devote at least one half day a week to the "lacrimal clinic" if many cases are to be treated, and the large number of dilatations involved renders the method rather tedious. In addition, despite the use of local anaesthesia, dilatation was a slightly painful procedure. It was considered inadvisable to inject an anaesthetic on each occasion owing to the soreness of the skin produced.

Considering the above objections the writer was pleasantly surprised to find that the patients were anxious to continue the treatment, indicating their appreciation of the relief of symptoms.

The presence of a stricture at the junction of the lacrimal sac and the naso-lacrimal duct has been denied, but the writer has shown by radiological findings and also at the open operation that such an abnormality exists in many cases of epiphora. After passing a

stricturotome it was quite evident that some constriction had been relieved because a large probe or bougie, previously impassable, then entered the duct without undue force being required to make it do so.

Summary

The results of 33 stricturotomy operations are analysed, and the causes of failure detailed.

Modifications of the French technique are suggested.

Its advantages compared with other methods of treating lacrimal obstruction are discussed.

The writer wishes to express his grateful appreciation to Mr. John Foster of Leeds, for introduction to the method and the reference quoted, and correspondence on the subject, also for permission to publish these cases treated in his clinic.

REFERENCE

BASTAN, N.—*Ann. d'Ocul.*, 171, Part 1, January, 1934.

ANNOTATIONS

Areopagitical

"Areopagitica: a speech for the liberty of unlicensed printing" was published by Milton in 1664 as an answer to an order in Parliament that "no book, pamphlet, or paper should be henceforth printed, unless the same was first approved and licensed by such, or at least by one of such, as shall be thereto appointed.

"Give me," said Milton, "the liberty to know, to utter, and to argue freely according to conscience, above all other liberties.

This was the beginning of a campaign for freedom of the press which ended in 1695, when William the Third ratified the bill for ending censorship. Everyone who writes or publishes owes a debt to Milton. Had we been editing the British Journal of Ophthalmology three hundred years ago we tremble to think of what might have happened to us after the publication of any particular number. Doubtless we should have been acquainted with the pillory, our nose might have been slit, our ears cut off, we might have been flogged at the cart tail from our domicile or consulting room to the printers' offices every other month; and the fines demanded of us would have soon landed us in the Fleet, or debtor's prison. But, happily for us, these barbarities are a thing of the past. And though

the censorship was revived during the War years, these penalties were not. This Journal was indebted to the Censor and his department for advice and assistance on many occasions.

Milton's sonorous sentence might well form the motto of all printing offices.

Mister or Doctor

In England it has long been the custom to address a surgeon as "Mister." This doubtless had its origin in times when surgery was practised only by the barber surgeons and was untouched by physicians. Samuel Johnson derives the word "mister" from the French word for a craft, *mestier*, the mystery of —, in our case the mystery of the barber surgeons. In 1215 Pope Innocent III prohibited ecclesiastics from undertaking surgical operations on the view that "Ecclesia abhorret a sanguine." However, the church in later years took to burnings and all the horrors of the Inquisition.

Towards the end of the last century some difficulty in this matter of address arose with the advent of the specialties which require both surgical and medical attention, for instance, gynaecology. At first a gynaecologist was called "Doctor," more recently the younger generation seem to prefer "Mister." In Scotland, and indeed elsewhere in the world, ophthalmologists are addressed as "Doctor," and this seems more proper than "Mister," for in the case of most ophthalmologists the surgical work of their practice is appreciably less than the medical work they do.

The pathologist retains the title of "Doctor" and this differentiates his academic and medically qualified status from the laboratory technician who in these democratic days may insist upon the address of "Mister" instead of "George." With the approaching state service and its plans to include optical practitioners (it seems that this is the last title they prefer to "consulting ophthalmic optometrists," "ophthalmic opticians," and so on) that in England we might conform to the custom of other countries and call the medically qualified eye practitioner "Doctor." Strictly speaking medical men should not be called "Doctor" unless they possess this University degree (which many ophthalmologists do) but it has been the practice in this country to accord this as a courtesy mode of address to any qualified man or woman practising medicine, regardless of whether the qualification is a bachelor of medicine and surgery or a diploma of the Colleges of Physicians and Surgeons. It would seem that now is the time to decide this point of whether the professional address of ophthalmologists might be altered to "Doctor."

THE CONTACT LENS SOCIETY

A NEW Society, purely scientific in object and organisation, has been formed for the study of contact lens work in all its aspects. Members may be medical or non-medical, and it is hoped to stimulate interest in the subject among optical workers, doctors, physiologists and others whose domain touches the question at any point.

The Secretaries of the Society, Mr. A. G. Cross and Mr. G. H. Giles, will be glad to supply information and forms of application for membership on receipt of a request addressed to 65, Brook Street, London, W.1.

The first scientfic meeting will be held on January 27, 1947, at 5.30 p.m., at the headquarters of the British Optical Association, 65, Brook Street, London, W.1. Thereafter it is hoped to hold scientific meetings four times a year, or more often if sufficient material is forthcoming.

As will be seen, membership of the Society requires nomination by three members of the Council. For the benefit of those wishing to join, officers of the Society are as follows:—

President: Professor Ida Mann; *Vice-Presidents*: Mr. F. A. Williamson-Noble and Mr. K. Clifford Hall; *Joint-Secretaries*: Mr. A. G. Cross and Mr. G. H. Giles; *Treasurer*: Mr. C. H. Keeler.

Other members of the Council are:—Messrs. J. H. Doggart, G. B. Ebbage, F. Juler, Sir Stewart Duke-Elder, Messrs. F. Dickinson, H. B. Marton. G. D. McKelien and T. Hamblin.

The Rules of the Society are as follows:—

1. *Object of the Society.* The object of the Society is the scientific study of contact lens work in all its aspects and the promotion of research into its various problems.

2. *Meetings.* Meetings shall be held as and when the Council deem necessary.

3. *Constitution.* Membership shall be open to anyone holding a medical or scientific qualification and engaged on work connected with the subject, provided that he is satisfactory to the Council and is willing to declare himself bound by ethical rules of a scientific Society. These are:—

(*a*) To keep no process or formula secret in any communication.

(*b*) To allow other members of Society to see records and to repeat experiments.

(*c*) Not to use membership of the Society as an advertisement.

(*d*) Not to use the Society as a forum for advertisement of commercial processes or preparations.

(*e*) To agree to answer to the best of his ability all scientific questions put by fellow members of the Society.

Such persons shall be ordinary members of the Society. The Council shall be nominated from among the members and shall contain equal numbers of medical and non-medical persons, the latter to include at least one representative of the dispensing opticians. There shall be 14 Founder Members nominated by the Contact Lens Sub-Committee of the Faculty of Opthalmologists. They shall retire at the end of two years and subsequently annually, and shall be eligible for re-election at the Annual General Meeting.

4. *Officers of the Society.* The officers of the Society shall consist of a President, two Vice-Presidents, two Hon. Secretaries, an Hon. Treasurer and not less than eight other members of the Council.

5. *Election of Officers.* The officers of the Society shall be elected yearly by ballot, after the first two years, at the Annual General Meeting. A balloting list of the names recommended by the Council, from their number, for election shall be posted to each member two weeks previously.

6. *Admission of Members.* Subsequent members shall be proposed by three or more members, but can only be admitted by a unanimous vote of the Council. Applicant should state the nature of his connection with and interest in contact lens work, and his intention to abide by the ethical rules of the Society.

7. *Subscriptions.* The annual subscription shall be initially £1 1s. 0d. per year. Any member whose subscription is twelve months in arrears shall, at the discretion of the Council, cease to be a member of the Society.

8. *Duties of Officers. The President* shall regulate the proceedings of the Society and Council and enforce observance of the rules.

One of the *Vice-Presidents* shall deputise for the President in his absence.

The *Hon. Secretaries* shall conduct correspondence, keep minutes of meetings, notify new members of their election, notify the Hon. Treasurer of resignations or death or changes of address. They shall arrange the meetings with the President, and shall arrange for the publication of papers communicated, subject to agreement with an Editorial Committee.

The *Hon. Treasurer* shall receive money, make payments and keep accounts. The accounts shall be audited and presented at the Annual General Meeting. The Auditors shall be nominated at the Annual General Meeting.

9. *Meetings of Council.* Council shall meet as and when deemed necessary and not less than three times per year. Five members shall constitute a quorum. The President shall have a casting vote in addition to his ordinary vote. The Council shall decide upon all questions relating to publications and communications and shall have

power to submit any paper to referees. A summary of all intended communications must be submitted to the Council before being read.

10. *Vacancies of Officers.* Vacancies on the Council may be filled by co-option during a current year and by nomination and election at the Annual General Meeting.

11. *Publication of Papers.* After being passed by the Council, publications may be submitted to the appropriate journals by the author and Hon. Secretaries in consultation.

12. *Notice of Meetings.* One month's notice of meetings shall be sent to each member.

13. *Visitors.* No representatives of the press shall be admitted. Each member may bring one visitor to one meeting only.

14. *Funds.* It shall be in the power of the Council to allocate grants from the funds of the Society for research, but such grants must be approved by a General Meeting of the Society.

BOOK NOTICES

Physiologie Oculaire Clinique. By A. MAGITOT. Editors: Masson et Cie, Paris. Pp. 458, with 235 figures. 1946.

Ophthalmologists in every country in the world will be interested to know of a book on the physiology of the eye written by Magitot of Paris, for in our generation he is one of the few masters in this branch of our subject who has spent a great part of his life exploring its many illusive and fascinating problems. For a quarter of a century he has been a systematic explorer in this wide field and whenever questions arise regarding the intra-ocular pressure, the ocular circulation or the reflexes governing the activities of the eyes, the opinions of Magitot must always be consulted and are usually respected. It is good that he has had the opportunity to set out and analyse our knowledge as it stands to-day in a comprehensive and authoritative volume which will disappoint few who read and study its pages,

In its scope the book is comprehensive and takes in all aspects of the physiology of the visual system—the eye, its central connections and the higher perceptual centres. The first chapter deals with the protective mechanism—the lids and lacrimal apparatus; the second with the sensory (trigeminal) mechanism. The following three chapters deal with the nutrition of the eyes, the vascular circulation, the nature of the aqueous and vitreous, and the factors controlling the intra-ocular tension. In view of Magitot's classical contributions to this subject it is not surprising that these are among the fullest and best chapters in the book. The theory of dialysation of the

intra-ocular fluids is accepted in its totality and a strong case made out for its validity. Then follow chapters on the physiology of the conjunctiva, the cornea, the iris and pupillary reactions, the lens and the retina. The physiology and pathology of the pupillary reactions are unusually well described, and the account of the physiology of the retina and of vision is of more than usual interest. Magitot adopts the somewhat original treatment of describing the dual activities of the retina quite separately—the "diurnal" retina comprising the function of the cones and colour vision, and the "nocturnal" retina dealing with the rods, the visual purple and dark adaptation. There follows a most interesting discussion of the optic pathways. The more recent work of Adrian, Hartline, and particularly of Granit is well summarized and a strong case put forward for the presence in the optic nerve and visual paths of fibres with different functions, not only visual and pupillary fibres, but among the former a further differentiation of fibres carrying impressions of light, form and different colours. The chapter on the higher organisation of vision at the cortical level deals with the recent knowledge contributed by the neuro-surgeon to the functions of the brain and discusses the various types of hemianopias, cortical blindness, psychical blindness, the visual agnosias and disorders of disorientation; the author in this part of his book follows closely the teaching of Lhermitte. The final section dealing with ocular movements and their central nervous organisation and with binocular vision is the least authoritative and original in a volume which covers a range of subjects so vast that the standard cannot be reasonably expected to be on the same level. Physiological optics are entirely omitted.

The book is written not by a pure physiologist but by a clinician, and one of its best features is the stress laid upon clinical questions and the intimate relation of physiological principles to clinical problems. The applications of physiology to pathology are constantly stressed, and this approach to clinical pathology constitutes one of the most useful aspects of the book. Some of the most recent works on the vegetative physiology of the eye and on the neuro-physiology of vision are not mentioned, but presumably current literature was difficult to obtain in France during the war. Bibliographical references are limited to the more important contributions and are by no means comprehensive.

On the whole this is a good, if not an excellent volume which will find a welcome and respected place in ophthalmic literature. The author is to be congratulated on his industry, his philosophy and the clarity of his exposition—to read the book has been a pleasure. And the publishers are to be congratulated on the maintenance of their high pre-war standand in the paper, printing and illustrations of what is quite a luxurious volume.

Transactions of the American Ophthalmological Society. Vol. XLIII. 1945.

The Eighty-first Annual Meeting of the American Ophthalmological Society was held at The Homestead, Hot Springs, Va., on November 12, 13 and 14, 1945. Vol. XLIII of the Society's Transactions contains 591 pages devoted to original communications. The first of these, by Colonel Derrick T. Vail is a charming narrative of his experiences as ophthalmic consultant to the American Forces in England and later in France.

We hope to publish abstracts of the other papers in the abstract section of the British Journal of Ophthalmology. This volume also contains lists of the Society's Officers, Council, past Presidents, members and the recipients of the Howe Medal.

This volume is of the usual high standard that characterizes these Transactions. Its production in printing, paper and illustrations is good.

Transactions of the Ophthalmological Society of the United Kingdom, Vol. LXV. London: J. and A. Churchill, Ltd. 1946.

The 65th volume of the *Transactions* is a much more bulky article than its immediate predecessor. It contains the list of communications read at the Annual Congress in May, 1945, together with the report of the joint clinical meeting of the society with the Section of Ophthalmology of the Royal Society of Medicine, the proceedings of the Oxford Ophthalmological Congress and those of the Irish Ophthalmological Society. Many of the papers are of considerable interest and of permanent value; such as the reports of the discussion on the ocular sequelae of head injuries, the Doyne Lecture and A. J. Mooney's paper on the visual manifestations of head injuries. A colour plate illustrates O. Gayer Morgan's paper on a case of crush injury to the chest associated with ocular complications. We hope that by the time Vol. LXVI is publshed the rest of the affiliated societies will have resumed their work; and that the volume as a whole will have got back to pre-war size. At the same time a word of congratulation is due to the Society, and particularly to Mr. Frank Law, for the way in which the sequence of 65 volumes has been unbroken in spite of the difficulties of the past seven years.

Instrumental Optics. By G. A. BOUTRY. Paris: Masson et Cie., 1946.

There is no such thing, says Boutry, as a *complete* treatise on instrumental optics. However far the technique of construction may advance, some margin of instrumental error will persist, and even if a perfect optical engine could be designed, the manifestations

of its activity would still have to filter through the interpretative mist of the human eye. Indeed the voice of scientific authority is gentler than it was two generations ago. The grim, rationalistic monuments of science erected in the nineteenth century have crumbled away, to be succeeded by the rarified world of quanta and electrons, more subtle and fantastic than webs spun by philosophers.

The most enchanting trait of present-day physicists is their readiness to waive old and treasured hypotheses. We are apt to take for granted the new doctrine that light does not travel *only* in straight lines, and consternation is no longer registered at the failure of thermodynamic laws to account for all the phenomena. It was not always so. Nor are old theories the only ones now to be abandoned. What happens when the enlightened modern scientist has to face facts that conflict with Planck's principle of the discontinuity of radiant energy? He gaily falls back upon electromagnetic undulations as a means of restoring continuity, and he denies the possibility of synthesising the truth about luminous energy in one comprehensive statement. What a contrast with Victorian science, which not only reconstructed monsters from single bones, but even achieved the regimentation of atoms!

If any one is tempted to boast of his facility with the microscope or with any other up-to-date optical device, he should surely call to mind the accomplishments of our forefathers, who pursued such detailed observation in spite of their crude appliances. Boutry recalls how Leeuwenhoeck succeeded in discovering spermatozoa by means of a seventeenth-century loupe. Since then a vast number of refinements have been evolved. The modern lens is elaborately contrived to avoid marginal astigmatism, field curvature and other sources of distortion, but the necessary calculations are rendered comparatively simple by experience handed down through several centuries. The author of Instrumental Optics fully acknowledges his debt to the pioneers, as well as to his contemporary colleagues.

Prisms, cylinders and the optical faults of the human eye are considered at some length, but Boutry does not profess to describe the minutiae of ocular anatomy and physiology. The fifth and last part of the book consists of a systematic, well-illustrated survey of instruments, including telescopes and spectroscopes. Considerable attention is also focused upon the optical problems of microphotography, but the most detailed study of all is reserved for the microscope. The author is to be congratulated on a skilfully planned book, which represents a notable addition to the long list of scientific achievements already standing to France's credit.

NOTES

Honours

THE Société Belge d'Ophtalmologie has made Sir Stewart Duke-Elder an honorary member.

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Western Ophthalmic Hospital. Annual Report, 1945

THE Ninetieth Annual Report of the Western Ophthalmic Hospital shows that since the cessation of hostilities the out-patient attendances and admissions to the wards have both increased. It is hoped to adapt the former quarters of the nursing staff for the use of in-patients. Extra accommodation is urgently needed in view of the long waiting list. Most of the honorary staff, who were on war service, are now returned. Details of finance are appended.

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Ophthalmological Society of the United Kingdom. Annual Congress, 1947

THE Annual Congress of the Ophthalmological Society will be held in Glasgow, on March 27, 28 and 29, 1947.

The President's address is entitled: "De Senectute."

The subject for discussion will be "Rhinology in relation to Ophthalmology" which will be opened by Dr. John Marshall (Ophthalmic Surgeon), Mr. Gilbert H. Howells (Ear, Nose and Throat Surgeon), and Dr. R. McWhirter (Radiologist). Members who desire to take part in the subsequent discussion are not required to intimate their intention before the Congress. No member may speak for more than ten minutes.

Members wishing to read papers are asked to send the titles to Mr. E. F. King, 79, Harley Street, W.1, as soon as possible. Abstracts of papers, which will be circulated at the Congress and subsequently to the leading ophthalmological journals abroad, should be submitted not later than January 31, 1947.

On Friday afternoon there will be a clinical meeting at the Glasgow Eye Infirmary.

On Saturday afternoon visits have been arranged to the Corporation of Glasgow Art Galleries, Kelvingrove, under the guidance of the Director Dr. T. J. Honeyman, and to the Hunterian Museum of the University of Glasgow, by invitation of the University Court.

Members who wish may stay at the University Hostel for men, Maclay Hall, 17, Park Terrace, Glasgow, C.3. Accommodation consists of rooms for two or three. The inclusive cost of bed and breakfast for the three days will be one guinea. Towels cannot be provided. Dr. J. D. Fraser, Tennent Memorial Institute of Ophthalmology, Western Infirmary, Glasgow, W.1, is prepared to make reservations at Maclay Hall, or at the Glasgow hotels. Members are invited to write directly to Dr. Fraser as soon as possible as hotel accommodation is severely limited.

The Annual Dinner of the Society will be held on Thursday, March 27.

Post-graduate Course in Ophthalmology

THE George Washington University Department of Ophthalmology is planning the resumption of the Wm. Thornwall Davis Intensive Post-graduate Course in Ophthalmology, February 3-8, 1947. These courses have been given annually except during the war when they were temporarily discontinued.

The following guest lecturers will participate:—Dr. F. Heed Adler, Philadelphia; Dr. J. Moson Baird, Atlanta, Ga.; Dr. S. Judd Beach, Portland, Maine; Dr. Hermann M. Burian, Boston; Dr. Ramon Castroviejo, New York City; Dr. C. Alvin Clapp, Baltimore, Md.; Dr. F. Bruce Fralick, Ann Arbor, Michigan; Dr. Dean B. Judd, Washington, D.C.; Dr. Peter C. Kronfeld, Chicago; Dr. Walter I. Lillie, Philadelphia; Dr. Angus L. MacLean, Baltimore, Md.; Mr. Philip L. Salvatori, New York City; Dr. Harold C. Scheie, Philadelphia; Dr. Edmund B. Spaeth, Philadelphia; Dr. Frederick W. Stocker, Durham North Carlina. Subjects of clinical interest to the practising physician doing eye work will be presented.

The 10th Annual Post-graduate Course in Ocular Surgery, Pathology and Orthoptics will be given during the week of January 27-February 1, 1947. The Army Institute of Pathology will give the instruction in pathology under the direction of Colonel J. E. Ash, Medical Corps, U.S.A., Scientific Director of American Registry of Pathology National Research Council. Colonel Ash will be assisted by Helenor Campbell Wilder, Ophthalmic Pathologist, Army Institute of Pathology; Lawrence P. Ambrogi, Chief of Laboratories, Army Institute of Pathology; Dr. M. Noel Stow, Dr. Arnold W. Forest and Miss Eleanor Paul.

The Surgery demonstrations will be given by the resident staff under the direction of Dr. Ernest Sheppard, Professor of Ophthalmology. This is a practical course with demonstrations on animal eyes.

For further details of the Post-graduate Courses in Ophthalmology write to the Secretary, Suite 34, 1801 K Street, N.W., Washington 6, D.C.

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Ophthalmological Society of Egypt

THE Annual Meeting of the Ophthalmological Society of Egypt will take place at the Memorial Ophthalmic Laboratory, Giza, on Friday and Saturday, March 14 and 15, 1947, at 9 a.m. Medical practitioners, oculists or otherwise, are cordially invited.

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Copyright material

A MEMORANDUM regarding the use of copyright material has been sent to us by the Publishers' Association Medical Group.

It is pointed out that in recent years, with the development of photographic methods of reproduction, the use of copyright material without permission has greatly increased.

Infringement of copyright is discussed under the following headings: "Digest" journals. "Abstract" journals. Films. Microfilms. Film strips, which are also known as film slides. Lantern slides. Mimiographic reproduction. Illustration, and lastly, photostats.

The legal position is as follows: "The reproduction without the consent of the owners of the copyright of any protected work or any substantial part thereof in any material form, is an infringement of copyright. The only exceptions, material for the present purpose are two in number.

(*a*) "If a teacher were to use an epidiascope to throw on the screen in front of his class an illustration from a copyright book there would be no infringement; but if he were to make a film slide of the illustration for use in the same way he would be infringing the copyright."

(*b*) "Photographs of sculpture or craftsmanship permanently situate in a public place or building do not involve an infringement of copyright."

There appears to be very little piracy of complete books in this country; but it seems that a certain amount of unauthorised reproduction of such parts as parts of the text, tables, illustrations and bibliographies has increased of late years.

The matter concerns both author and publisher and it is suggested that:

(*a*) Copyright material be not used without permission.

(*b*) Where such material is used, due acknowledgment is made to the source from which it is taken and "arrangements agreed as to the manner in which copyright material is used."

(*c*) Reasonable payment is made where the copyright material is to be put to a commercial use and in certain circumstances, *e.g.*, where the proposed use of the copyright material would be damaging in some way to the Publisher's and/or Author's interest.

Neither Publisher nor Author is any way inclined to take a dog-in-the-manger attitude, but the question needs to be regularised.

* * * *

Corrigendum IN Mr. Spencer Walker's paper on Myopia and Pseudomyopia, December, 1946, p. 739, para *2*, line 5, for "temporarily" read "eventually."